FORESTRY ABSTRACTS

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EDITORIAL NOTE

Readers of *Forestry Abstracts* are reminded that, as announced in the first number of Volume 13, this volume consists of *five*, instead of the normal four, quarterly parts. The present number, issued without extra charge to subscribers, completes the volume. The first number of Volume 14 will be published early in the first quarter of 1953; thenceforward the normal four numbers per volume will be published at regular quarterly intervals, so that all subsequent volumes will coincide with the calendar year.

Forestry Abstracts, Vol. 13, No. 5

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

3551. DOUGLAS, H. A. **Forestry for Gold Coast forest rangers.** *Bull. For. Dep. Gold Cst.* No. 3, 1949. pp. 79 + ii. 12 refs.

An elementary text-book.

0 (048.1). BIBLIOGRAPHICAL LISTS

See also Nos. 4145, 4433.

3552. Bibliographie des ausländischen Forst- u. Holzwirtschaftlichen Schrifttums: Folge 3 enthält Titel der Jahre 1950/51. **[Bibliography of foreign literature on forestry and wood utilization: No. 3—titles of 1950–51.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 26, 1951. Pt. I: pp. iv + 1–147. Pt. II: pp. iii + 148–237. Price [£1. 9*s*. 6*d*.]

3553. FLICK, F. J., and BROWN, E. P. **Economics of forestry: a bibliography for the United States and Canada, 1940–1947.** *Library List, U.S. Department of Agriculture, Washington* No. 52, 1950. pp. 126.

Lists 3821 articles and publications by the following major heads: the forest economy at large, land management, forest management (including non-timber commodities, roads, protection, valuation, taxation, insurance, credit), management of forest product harvesting and processing, the meeting of supply and demand; all selected from the economic angle. Some items are annotated. There is a general index.

3554. FRAGA, M. V. G. Bibliografia florestal para a questão brasileira. [A bibliography of Brazilian forest problems.] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (353–5). [Port.e.]

A list of the principal Brazilian works from 1907 onwards.

0 (052/054). PERIODICALS

3555. ***Istanbul Üniversitesi Orman Fakültesi Dergisi. Revue de la Faculté des Sciences forestières de l'Université d'Istanbul.*** Orman Fakültesi Dergisi Büyükdere, Istanbul. Half-yearly. Price varies according to size.

Series A Vol. 1, No. 1 for 1951 contains 214 pages. The individual articles, which are noticed in this issue of *For. Abstr.* under their appropriate subjects, have summaries in German (and for one article only, in English), and one of the longer articles is given in a full German version. Abbreviation in *For. Abstr: Istanbul Üniv. Orm. Fak. Derg.*

0 - - 011. TERMINOLOGY, NOMENCLATURE

See Nos. 3632–5, 3643, 4151–2, 4455.

0 - - 087. APPARATUS, INSTRUMENTS, MACHINERY: GENERAL

3556. **Equipment news.** *Unasylva* 5 (4), 1951 (175–9).

Descriptive notes with photographs of the following, amongst others: a precision dendrometer consisting of a Starrett No. 655-FL inch dial-gauge micrometer bolted across the top of a small T-shaped hardwood platform (L. S. Starrett Co., Athol, Mass.); automatic tree seed planter (walking-stick type) (Perpetual Forests Inc., Seattle); Terry high-pressure forest fire-fighting pump (Terry Machinery Co. Ltd., St. Laurent, Quebec); U.S.F.S. Tomcat log tractor, a tractor logging arch designed and built by the U.S. Forest Service; the Tasker trailer for hauling light poles or timber (Taskers Ltd., Andover, Hants., England); several portable chain saws; PPK deck saw for cutting in water (Ets. P.P.K., Courbevoie, Seine, France); a timber-measuring unit which accurately records lengths of timber in yards, feet, and inches or metres and decimetres, as required (English Numbering Machines Ltd., 9 Bennet St., St. James's, London, S.W.1).

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.1. Composition, Structure, Mechanics and Thermodynamics of the Atmosphere in General

3557. STRAND, L. Undersøkelse angående den innflytelse som kvelstofftapet ved salpeterfabrikasjonen har på granas diametertilvekst. [**Research on the effect on Spruce diameter increment of N loss [to the atmosphere] during the manufacture of saltpetre.**] *Medd. norske Skogforsøksv.* 11 (1) (No. 38), 1951 (79–127). 17 refs. [Nor.e.]

Annual-ring measurements were made on increment cores from trees in sample plots near and at some distance from the Rjukan Nitrate Factories established in 1911. The annual loss to the atmosphere between 1913 and 1948 of N unabsorbed during the manufacturing process ranged from 140 to 1680 tons, and the average loss for the period 1911–29 was almost double that for 1930–48. The measurements indicate that in trees near the factory there is a larger ring width for the years 1912–29 than was to be expected from the trend of ring widths in the period 1895–1911. It is difficult to decide whether the present N loss has any effect on current increment but analysis shows that the N content of needles is very high in the neighbourhood of the factory.

111.2. Radiation and Temperature

3558. ROUSSEL, L., and ROUSSEL, J. Contribution à l'étude actinométrique du climat du Haut-Doubs. [**A study of solar radiation in the Haut-Doubs.**] *Bull. Soc. for. Franche-Comté* 27 (5), 1952 (270–86). [F.]

With some indication of the strength and composition of light inside coniferous stands.

3559. AALTONEN, V. T. Jordstrålningens realitet. [**The reality of earth rays.**] *Skogen* 38 (9*), 1951 (94*). [Sw.]

In a further study [cf. *For. Abstr.* 12 (No. 2605)] a dowser, screened so that he could not see the type of forest, was taken by car through four of Cajander's forest types. The number of movements of the rod per 100 m. is shown for each type; this number, expressed in % of that for the *Oxalis-Myrtillus* type (OMT), showed close correlation with the yield of 100-year-old Pine stands on each type (also expressed in % of that for the OMT).

111.8. Climatology. Climate and Microclimate

See also Nos. 3558, 3850, 4456

3560. DOIGNON, P. Le mésoclimat forestier de Fontainebleau. 1. 56 années d'observations thermométriques. 2. Pluviométrie. 3. Hygrométrie; nebulométrie; anémométrie; barométrie; conclusions. [**The forest mesoclimate of Fontainebleau. 1. 56 years of thermometric observations. 2. Measurements of precipitation. 3. Measurements of humidity, cloud, wind, and barometric pressure. Conclusions.**] Centre régional de Recherches naturalistes, Fontainebleau. 1946; 1948; 1951. pp. 124; 128; 36. Many refs. [F.]

Meteorological records covering 56 years were available for this study of the effect of forest cover on mesoclimate. The town of Fontainebleau constitutes an opening in the middle of the forest, and its climate is clearly affected by the surrounding forest. Amongst the effects noted, as compared with stations just outside the forest, were a lowering of mean annual temperature by 1·5° C.; a more pronounced lowering of nocturnal and winter minimum temperatures; a slight increase in maximum temperatures; a sharp increase in the number of days with frost in sheltered stations and still more in the open (a mean annual increase of 40% and as much as 1300% in spring); an increase of 17% in mean annual precipitation, with a complex seasonal distribution; an aggravation (15%) and multiplication (10%) in light showers of rain of a boreo-oceanic character, while heavier, cyclonic rain was the same as that of the macroclimate; an increase in depth of snow (50–80%), in duration of snow cover (150–200%), and in number of snowfalls (13·4%); a reduction in the number of days with hail (10%) and an increase in those with sleet (70–90%); a reduction in the number of days of fog (average 24%); an increase in heaviness of dew and rime frost; a sharp decrease in number of thunderstorms (average 60%); a slight reduction in relative humidity (average 2·4%); a marked increase in the index of aridity, calculated from mean annual rainfall and temperature data (28%); a slight displacement in the direction of winds, and an important reduction in wind force (45–60%); and a characteristic composition of the atmosphere, with a high CO_2 and ozone content.

3561. ERMICH, K. Wskaźniki klimatyczne dla gospodarstwa leśnego w Polsce. [**Climatic indices for forest management in Poland.**] Instytut Badawczy Leśnictwa, Warsaw. 1951. pp. 24 + 35 tbls., 1 map. 20 refs. [Pol.russ.f.] Price *Zł.*17.20.

Presents tabulated data on the following meteorological factors observed in the 32 meteorological stations of Poland: average barometric pressure; average monthly temperature; average monthly maxima and minima, and average of absolute maxima and minima over some years; water vapour pressure at 1 or 2 p.m.; average water vapour pressure; Szymkiewicz's 'evaporation index'; average relative humidity, and average minimum r.h.; average cloudiness and insolation; total rainfall; maximum rainfall during 24 hr.; number of days with maximum (and minimum) temperature below 0° C.; average wind velocity; humidity quotient $Q = R/I$, where R is the total annual rainfall and I, annual total of the average maxima of the evaporation index; period of growth; evaporation rate.

3562. VINCENT, G., and KORENEK, J. Lesné pestebné oblasti ČSR. [**Silvicultural regions of Czechoslovakia.**] *Pol'ana* 7 (8/9), 1951 (147–50). 3 refs. [Slovak.]

Reference is made to the paper by Vincent *et al.* [see *For. Abstr.* 13 (No. 13)] and Slovakia is similarly divided into 5 growth regions: (1) Tatra (high mountains), (2) central Slovakia, (3) Bratislava plain, (4) Košice plain, and (5) foothills of the north-western Carpathians. (1) is a mountain massif type (chief species *Picea abies*—length of growing season 130 days or less); (2) and (5) are more dissected mountainous areas (*Pinus sylvestris* and *Fagus sylvatica*—130–165 days); while (3) and (4) include the plains and hills (*Quercus robur*—over 165 days). (1) represents 16·36% of the total area of Slovakia; (2) and (5), 43·29%, (3) and (4), 40·35%. Reference is made to a classification by Petrovič, who divided Slovakia into 3 regions: (*a*) N, NE, and NW slopes, and plains of E. Slovakia—short period of growth; (*b*) plains and plateaux of central and W. Slovakia—medium period of growth, and (*c*) S, SE, and SW. slopes—long period of growth. A table of periods of growth for these 3 regions is given for altitudes up to 1800 m.

3563. BURGERS, T. F. Algunas consideraciones sobre el uso de especies forestales australianas en España. [**The use of Australian forest species in Spain.**] *Montes, Madrid* 8 (43), 1952 (26–30). 3 refs. [Span.]

A map of Spain is presented in which the country is divided into 4 climatic regions. If $i =$

$$\frac{\text{average annual rainfall in mm.}}{\text{average annual temperature in } ^\circ\text{C} + 10}$$

its values in these regions are: (1) over 30, (2) 10–15, (3) 15–20, (4) 20–30. Maps of New South Wales and South Australia are also given, on which similar climatic regions are marked. Species growing in these Australian regions, and species growing in the corresponding Spanish regions are listed.

3564. SHUTTS, C. F. **Microclimates of four adjacent areas in the chaparral of San Dimas Canyon, California.** *Abstr.* in *Proc. Indiana Acad. Sci.* 60, 1950 (81). A.P.B.

The data collected show that : (1) frost pockets may be formed through the restriction of air movement by dense vegetation; (2) the decrease of air temperature mean values with increase in height above the ground may be reduced by vegetation; (3) the seasonal changes in the angle of insolation cause greater seasonal variations of soil temperature and evaporation on north slopes than on south; and (4) the determination of vegetational climaxes in southern California is due principally to the soil-moisture factor. [Cf. *For. Abstr.* 13 (No. 3718).]

114. *Soil. Soil Science*

114.1. Soil Physics

See also Nos. 3564, 3570, 3718, 3750, 3849–51, 4093–5, 4456.

3565. SWANSON, C. L. W. **A new concept—using chemicals for soil structure improvement.** *J. Soil Wat. Conserv.* 7 (2), 1952 (61–7). 13 refs.

Gives an account of the means by which Krilium acts on soil, and results of some experiments with it. [Cf. *For. Abstr.* 13 (p. 351).]

114.2. Soil Chemistry

See Nos. 3567, 3575, 3581, 3592, 3948, 3958, 4456.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 3570, 3573, 3575, 3581, 3785, 3946–7, 4093–5.

3566. SCOTT, D. R. M. **Growth of hybrid Aspen in pot cultures of the litter of forest plants.** *J. For.* 50 (2), 1952 (107–8). [Division of Research, Ontario Department of Lands and Forests, Madle, Ont.]

An experiment was set up to determine the relative ability of the litter of several tree and subordinate vegetation species typical of the forests of N.W. Connecticut to supply plant nutrients. Hybrid Aspen cuttings of a single clone were planted in pots in mixtures of various types of litter and silica sand, and grown for 6 months. The litter of subordinate forest vegetation generally proved superior to the litter of tree species. There appeared to be little correlation between the content of nutrient elements (N not measured) in the litter from various species, and the effects of the litter on the growth of hybrid Aspen. *From author's summary.*

114.4. Soil Classification. Soil Types

See Nos. 3573, 3712.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 3559, 3566, 3592, 3719, 3813, 3948, 4093–5, 4459.

3567. SEIFERT, J. Půdně biologická studie lesních společenstev ve Velké Fatře. [**A soil-biological study of forest associations at Velka Fatra [Slovakia].**] *Lesn. Práce* 29 (9/12), 1950 (343–56). 15 refs. [Cz.cz.russ.e.]

As part of an extensive sociological study of forest stands in Velka Fatra, a soil study has been carried out in order to establish to what extent the characteristics of the individual forest associations are reflected in the biology of their soils. The properties studied were: (1) 'ecological' (catalytic activity, pH, content of organic matter, and C/N ratio), and (2) biological (nitrification and ammonification, biological activity, decomposition of organic matter, number and species of cellulose-destroying bacteria). Soils from 11 different associations were examined. It is concluded that if the 'ecological' factors are bad, but the biological ones good, the soil can and should be improved; if both sets of factors are unfavourable, the soil is unsuitable for the given stand. Among the associations studied, the *Abieto-Fagetum asperuletosum* showed the highest biological activity, and an example of an unsuitable locality was found in the case of *Fagetum nudum.*

114.6. Soil Biology

See also Nos. 3567, 3769, 4017.

3568. LAUDELOT, H., and DU BOIS, H. Microbiologie des sols latéritiques de l'Uele. **[The microbiology of the lateritic soils of Uele [Belgian Congo].]** *Publ. Inst. nat. Étude agron. Congo belge (Sér. sci.)* No. 50, 1951. pp. 36. 23 refs. [F.] Price *Fr.*30.

The first part of this bulletin reviews existing data on the subject, particularly comparisons between the microbiology of lateritic soils under forest cover and savanna respectively. The second part reports on two experiments, (1) on the effect of mulching, (2) on the effect of different agricultural rotations. (1) It is concluded that mulching has a beneficial effect only when the soil is well provided with mineral nutrients, or in conjunction with artificial mineral fertilizers, which can only so be usefully employed on tropical soils. (2) In order of decreasing abundance, the following distributions of the commoner genera of soil fungi were observed:—

Forest fallow: (3 years old)	Various phycomycetes, *Trichoderma*, *Penicillium*, *Aspergillus*.
Pennisetum fallow: (3 years old)	*Penicillium*, *Trichoderma*, phycomycetes, *Aspergillus*.
Cultivation: (6 years)	phycomycetes, *Penicillium*, *Aspergulus*.
Forest:	a more varied microflora, with *Trichoderma* as the only dominant genus.

It is concluded that 3 years of fallow (forest or *Pennisetum*) exercise little effect on the microflora of the superficial soil layers beyond a slight modification in its floristic composition. There were indications that sandy soils respond more rapidly than red or yellow clay soils to a given type of fallow by modifications in their microflora.

3569. GÄUMANN, E., and JAAG, O. Bodenbewohnende Algen als Wuchsstoffspender für bodenbewohnende pflanzenpathogene Pilze. **[Soil-inhabiting algae as suppliers of growth substance to soil-inhabiting fungi pathogenic to plants.]** *Repr.* from *Phytopathologische Zeitschrift* 17 (2), 1950 (218–28). 8 refs. [G.g.] P.R.

Cultures were made on a vitamin-free agar nutrient medium, with added glucose, of 18 soil algae belonging to the Volvocales, Chlorococcales, Ulothricales and Chaetophorales, previously found to thrive under these conditions. Two months later, the cultures were inoculated with four fungi known to be aneurin-heterotrophic to varying degrees, viz. *Phytophthora cambivora*, *Phycomyces blakesleeanus*, *Polyporus adustus*, and *Mucor ramannianus*. These were selected in preliminary tests from a total of 18 fungi, of which the remaining 14 were all able to grow in the absence of added growth substance, though growing more vigorously when it was present.

All of the algae were found to be aneurin-autotrophic and capable of supplying considerable amounts of growth substance to the medium. For some unknown reason, two of the test fungi (*P. adustus* and *M. ramannianus*) failed to show a macroscopically visible response to the growth substance of certain algae (*Chlorella vulgaris*, *Chlorococcum humicola*, *Coccomyxa pringsheimii*) until 8 weeks after the start of the tests. In no case did the fungi parasitize the algae, but in some cultures the mycelium was dense enough to cause etiolation of the algae by reducing light.

3570. HANDLEY, W. R. C. **[Effect of litter-destroying fungi on soil structure.]** *Rep. imp. For. Inst. Oxf. 1950/51*, 1952 (9).

In the course of work on the microbiological aspects of the problem of protein-complex formation [cf. *For. Abstr.* 12 (No. 2622)], it has been observed that some of the strains of wood- and litter-destroying fungi used have synthesized relatively large amounts of jelly-like material from soluble materials obtained from leaves and litter. It seems likely that such materials may be of importance in the formation of crumb structure in mull soils.

3571. LINDEBERG, G., and HOLM, G. **Occurrence of tyrosinase and laccase in fruit bodies and mycelia of some hymenomycetes.** *Physiol. Plant., Copenhagen* 5 (1), 1952 (100–4). 19 refs. [E.e.]

Further researches on the metabolism of litter-decomposing hymenomycetes [cf. *For. Abstr.* 11 (No. 40)]. Two mycorrhiza-forming species, *Boletus versipellis* and *Lactarius deliciosus* were among those studied.

3572. PRUSINKIEWICZ, Z. Bezkręgowa fauna glebowa naszych lasów. **[Non-vertebrate soil fauna of Polish forests.]** *Sylwan* 96 (1), 1952 (46–52). 30 refs. [Pol.]

The incidence of Nematodes, Oligotricha, Isopoda, Diplopoda, Chilopoda, Insecta, Acari, and 'other' animals is tabulated for soil samples from some Beech and Pine forests. In Beech forest soil, Acari and Apterygota were the most numerous among fauna reacting to the Tullgren method.

114.7. Soil Surveys and Surveying

3573. SMITH, R. **Pedogenesis in Frankland River Valley, W.A.** *Bull. Commonw. sci. industr. Res. Organ. Aust.* No. 265, 1951. pp. 32. 16 refs.

[Cf. *For. Abstr.* 13 (No. 2743).] The area covered includes Karri and Jarrah forests, Wandoo, and Mallee and scrub.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 3664, 3719, 3723, 3808 *et seq.*, 3853, 3959, 4456, 4460, 4471.

3574. RYCROFT, H. B. **Hydrological research in South African forestry 1947 to 1951.** Government Printer, Pretoria. 1952. pp. 13. 13 refs. (Commonwealth Forestry Conference, Canada, 1952.)

General progress in hydrological research in South Africa is reported. The influence of replacing the natural sclerophyll shrubs by a plantation of *Pinus radiata*, now 12 years old, is examined, and it is shown that stream discharge has not been significantly affected by the treatment. A critical review of the methods of investigation leads to the conclusion that these are satisfactory, but it is considered that the influence of variations in rainfall on stream

discharge should in future be studied more intensively. *Author's summary.* [Cf. *For. Abstr.* 9 (No. 732).]

3575. LINSKENS, H. F. Niederschlagsmessungen unter verschiedenen Baumkronentypen im belaubten und unbelaubten Zustand. [**Measurements of precipitation under different types of tree crown both with and without foliage.**] *Ber. dtsch. bot. Ges.* 64 (7/8), 1951 (214–20). 25 refs. [Botanisches Institut der Universität Köln.] O.B.D.

Measurements were taken under *Fagus sylvatica* f. *atropurpurea*, *Pyrus malus* f. *pendula*, *Quercus robur* var. *fastigiata*, *Acer palmatum* var. *dissectum* f. *viridis*, and *Cedrus libani*, and the pattern of penetration is shown in diagrams. The influence of crown shape and of the presence or absence of foliage, and the effects of the rainfall on the chemistry of the soil beneath, are discussed.

3576. KRAMER, P. J. **Plant and soil water relations on the watershed.** *J. For.* 50 (2), 1952 (92–5). 24 refs.

A review of literature (mainly American) on the effects of vegetation on soil water, notably through transpiration.

3577. GOODELL, B. C. **Watershed-management aspects of thinned young Lodgepole Pine stands.** *J. For.* 50 (5), 1952 (374–8). 4 refs.

Studies in dense young Lodgepole Pine stands in the mountains of Colorado and Wyoming showed that thinning of such stands increased net precipitation without increasing soil-moisture losses or causing soil erosion. Thinnings that reduced basal area by 55% caused an additional 2·2 in. of total snow-melt in a 21-day period. The methods of measuring snow-melt are described in some detail.

3578. **Increased stream flow through cutting forest stands.** *Rep. Stheast. For. Exp. Sta. 1951* [1952] (22–3).

Analysis of data (shown in a graph) from a 40-acre coppice forest catchment 11 years after clear felling in 1939, shows diminishing streamflow as the trees grow older and transpiration increases; streamflow increased 60% in the first year after felling and this increase was reduced most rapidly during the first 3 years after felling. Tabulated results of another study show the increased water yield produced by felling (1) all major vegetation and (2) only the Laurel [*Kalmia*] and Rhododendron understorey.

3579. MARSTON, R. B. **Ground cover requirements for summer storm run off control on Aspen sites in Northern Utah.** *J. For.* 50 (4), 1952 (303–7). 6 refs.

A ground cover of at least 65% appears to be a reasonable minimum requirement in the humid mountainous forest and range lands of northern Utah.

3580. NAKANO, H., and OTAKI, I. **Experiments in water conservation at Tatsunokuchi. Bulletin III.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 44, 1950 (31–70). [Jap.e.]

A third progress report on a long-term water-catchment study, begun by the Meguro Experiment Station in 1937. Features of the two adjacent areas under comparison are detailed. Both were forested with *Pinus densiflora* plus 5–7% of *Chamaecyparis obtusa*, one completely, the other having high forest on 83% of the area and the rest Pine regeneration in a dense herbaceous cover. This latter area was to have been clear felled in 1945 for a comparative study, but increasing barkbeetle attack necessitated both areas being clear felled in that year. Results for 1937–47 from rain gauge readings and a 60° V-notch weir are analysed and discussed, with graphs. The annual run-off coefficient has tended to rise steadily in both areas.

3581. VORONKOV, P. P., and SOKOLOVA, O. K. Vlijanie oblesennosti vodosbora na veličinu ionnogo stoka. [**Influence of the forest cover of a catchment on the magnitude of 'ionic run-off' [i.e. removal of inorganic substances in true solution].**] *Dokl. Akad. Nauk SSSR* 81 (4), 1951 (561–4). 6 refs. [Russ.] A.P.B.

In 1948–9 the State Hydrological Institute, Leningrad, made a study of streamflow and the content of dissolved inorganic matter in the stream water, in two valleys, each with a catchment of 0·44 sq. km. and 'very similar' as regards soil and 'hydrogeological' conditions—having a 0·5-m. layer of permeable sandy loam over a relatively impermeable clay-loam subsoil—but differing in that (1) bore closed forest [composition not indicated] and (2) was devoid of woody vegetation. Self-recording stream gauges were used and from time to time throughout the year, samples for analysis were taken from the stream at the gauging points. Results are tabulated to show streamflow and total quantity of dissolved minerals per sq. km. of catchment. Throughout both years the mineral content of the water from (1) was lower than that for (2), the means for 1948 and 1949 being respectively 55 and 53 mg./litre for (1), and 84 and 76 mg./litre for (2). Except after spates, when (1) continued to release water for a longer period, the volume of flow from (1) was the smaller, a fact attributed to greater losses in interception and transpiration, coupled with seepage via the channels opened through the heavy subsoil by tree roots. The total quantities of mineral ions removed in solution in 1948 and 1949 are estimated at 9·2 and 9·0 tons/sq. km. for (1), but 25·2 and 27·7 tons/sq. km. for (2). For both areas the spring highwater period accounted for 30–50% of the annual loss of dissolved minerals, the winter and summer periods of low water each accounted for 2–10%, and the autumn for the remainder.

3582. JOHNSON, E. A. **Effect of farm woodland grazing on watershed values in the Southern Appalachian mountains.** *J. For.* 50 (2), 1952 (109–13).

Report on experimental data from Coweeta on the effects of grazing cattle in mixed hardwood forest. The deleterious effect on ground vegetation and the effect of soil compaction etc. on run-off are described and discussed.

3583. **Douglas-Fir region old growth management [: stream flow and erosion studies].** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1950*, 1951 (29–31).

Studies in the Blue River Experimental Forest indicated that most stream sedimentation came from road-building and road use. In logging, most

erosion damage resulted from using heavy equipment during periods of surface run-off. Previously logged areas caused serious turbidity only during the heaviest rains. Yarding across streams, in the few cases where this was essential, was an important source of sedimentation even in dry weather. Recommendations are made for road planning and construction to reduce sedimentation. A trial has begun on the effect of streamside treatment in logging when (1) a wide strip of timber is left between the first road level and the stream, (2) and (3) trees are felled right to the bank on steep and gentle slopes respectively; and (4) a narrow belt of trees is left along the bank. Conclusions at the end of the first year were that all four methods successfully prevented interference with the stream either by increased turbidity or by the accumulation of logging debris. Observations on erosion and regeneration problems will be made.

3584. ČEMEKOV, JU. F. Drevesnye alljuvialjnye otloženija. [Woody 'alluvial' deposits.] *Priroda, Moskva* 40 (11), 1951 (54–6). [Russ.] A.P.B.

Describes driftwood deposits of natural origin formed along rivers in the *taiga* zone of Siberia and the Far East as the result of the erosion of wooded streambanks.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 4012 *et seq.*, 4343 *et seq.*

3585. BRADLEY, G. A. **A field key to the species of *Cinara* (Homoptera: Aphididae) of Canada, east of the Rockies.** *Repr.* from *Canad. Ent.* 83 (12), 1951 (333–5). (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 19.)

3586. PETERSON, A. **Larvae of insects: an introduction to nearctic species. Pt. 2. Coleoptera, Diptera, Neuroptera, Siphonaptera, Mecoptera, Trichoptera.** Published by the author, Ohio State University, Columbus, Ohio. 1951. pp. v + 416. Many refs. Price $7·50 [£3.]

3587. PANT, G. D., and CHATTERJEE, N. C. **A list of described immature stages of Indian Lepidoptera. Part 2. Heterocera.** *Indian For. Rec.* (*n.s.*) *Entomology* 7 (9), 1951 (267–333).

Cf. *For. Abstr.* 12 (No. 1868).

3588. WELLINGTON, W. G., SULLIVAN, C. R., and GREEN, G. W. **Polarized light and body temperature level as orientation factors in the light reactions of some hymenopterous and lepidopterous larvae.** *Repr.* from *Canad. J. Zool.* 29, 1951 (339–51).

Larvae of *Neodiprion banksianae*, *Malacosoma disstria* and *Cacoecia fumiferana* were used to demonstrate the effects of heat and plane-polarized light upon the photic orientation of immature insects. [Cf. *For. Abstr.* 13 (No. 43).]

3589. RADCLIFFE, D. N. **Diapause in the Douglas-Fir cone moth [*Barbara colfaxiana*].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (3).

3590. BRYGIDER, W. **In what embryonic stage do the eggs of *Neodiprion* enter the winter diapause?** *Canad. J. Zool.* 30 (2), 1952 (99–108 + 10 photos). 8 refs. P.R.

15. ANIMAL ECOLOGY (INCLUDING GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING)

See also Nos. 3921–2, 4008–11, 4013, 4052, 4058, 4060.

3591. DARLING, F. F. **Mammals and forestry.** *Advanc. Sci.* 8 (32), 1952 (413–7).

Discusses the beneficial and the harmful effects on forests of predators, grazers and browsers, insectivores and rodents, with particular reference to Great Britain, and the ecological problems met in maintaining a balance between animal populations favourable for forestry or for farming.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 3606, 3655, 4199 *et seq.*, 4402 *et seq.*

3592. FUJIMOTO, G., and SHERMAN, G. D. **Cobalt content of typical soils and plants of the Hawaiian Islands.** *Agronomy Journal, Madison, Wis.* 42 (12), 1950 (577–81). 11 refs. H.S.B.

Samples of vegetation growing on typical soils were analysed and a study was made to determine the influence of soil type on the Co content of the plants. Results are tabulated. There was no evidence of any relationship between the Co content of the soil and that of the plant.

3593. NĚMEC, A. **Obsahy oleje a minerálních látek v semenech tisu a jedle. [The contents of oil and mineral substances in seeds of Yew and Silver Fir.]** *Sborn. čsl. Akad. zeměd.* 24 (5), 1951 (419–21). 4 refs. [Cz.cz.russ.e.] C.G.B.

The oil and K content of Yew seeds is higher and the SiO_2 content lower than in other conifers. Yew seeds contain more P_2O_5 than Fir seeds, but less than Pine seeds.

3594. FRIESE, W. **Beitrag zur Kenntnis der Eibe (*Taxus baccata* L.). [The Yew.]** *Pharmazeutische Zentralhalle für Deutschland, Dresden* 90 (8; 9), 1951 (259–62; 289–91). 24 refs. [G.g.] L.S.

A review including the following information: occurrence of the Yew in Germany in the past; its various names and uses; its morphology; chemical structure of the taxin alkaloid, and various information on the chemistry of leaves and seed. [Cf. *For. Abstr.* 13 (No. 4218).]

3595. PLOUVIER, V. **Sur la recherche du pinitol chez quelques conifères et plantes voisines. [Investigations on pinitol in some conifers and related plants.]** *C.R. Acad. Sci., Paris* 234 (3), 1952 (362–4). 2 refs. [F.] O.R.S.

Gymnosperms of 66 species were examined. Pinitol was extracted from the 36 Pinaceae, from *Sequoia gigantea* and *S. sempervirens* among the 7 Taxodiaceae, from *Thujopsis dolabrata*, *Thuja occidentalis* and *Chamaecyparis lawsoniana* among the Cupressaceae, and from *Ginkgo biloba*. It was not found among the Taxaceae or neighbouring families. Saccharose was isolated from leaves of *Ginkgo*

biloba, Torreya californica, Podocarpus macrophyllus and *Cephalotaxus drupacea*, and from shoots of *Cryptomeria japonica, Thuja gigantea* and *Chamaecyparis lawsoniana*.

3596. BARTON, D. H. R., BRUUN, T., and SÖRENSEN, N. A. **The constitution of 'cryptopinone'.** *Acta chem. scand.* 5 (9/10), 1951 (1356–8). 4 refs. [E.e.] O.R.S.

'Cryptopinone' isolated from *Pinus sylvestris* has proved to be *dextro*-pimarinal. [Cf. *For. Abstr.* 10 (No. 1595).]

3597. COLDWELL, B. B., and DELONG, W. A. **Studies on the holocellulose fraction of hardwood leaves.** *Sci. Agric.* 32 (2), 1952 (99–108). 44 refs. O.R.E.

3598. BRUNEL, A. La notion des plantes à uréides, son application aux Légumineuses d'Indochine. **[The conception of plants containing ureides, and its application to the Leguminosae of Indo-China.]** *C.R. Acad. Sci., Paris* 234 (14), 1952 (1470–2). 1 ref. [F.] O.R.S.

An examination of species of the Caesalpinioideae, Mimosoideae, and Papilionatae, including a number of trees, showed that plants containing ureides (i.e. those in which the glyoxylic ureides, allantoin and allantoic acid, play an important part in nitrogenous metabolism) are found most often among the subfamily Papilionatae.

3599 COOKE, R. G., DOWD, H., and WEBB, L. J. **Naphthoquinones from *Diospyros hebecarpa*.** *Nature, Lond.* 169 (4310), 1952 (974). 2 refs. [University of Melbourne and C.S.I.R.O., Brisbane.]

Leaves and bark were found to contain plumbagin (which is probably responsible for reported poisoning of livestock) and a new crystalline compound, 7-methyl-juglone.

3600. PLOUVIER, V. Nouvelles recherches sur le mannitol et le syringoside de quelques Oléacées. **[Further investigations on mannitol and syringoside in some Oleaceae.]** *C.R. Acad. Sci., Paris* 234 (15), 1952 (1577–9). 2 refs. [F.] O.R.S.

Mannitol was isolated from all the species examined (*Syringa* spp., *Ligustrum* spp., *Jasminum* spp., *Fraxinus* spp., *Notelaea excelsa* and *Olea* spp.); syringoside was isolated from many species but has not yet been found in *Fraxinus* or *Notelaea*. [Cf. *For. Abstr.* 11 (No. 66).]

3601. WINTER, A. G., and WILLEKE, L. Untersuchungen über Antibiotica aus höheren Pflanzen. IV. Mitteilung. Hemmstoffe im herbstlichen Laub. **[Research on antibiotics from higher plants. IV. Inhibiting substances in autumn leaves.]** *Naturwissenschaften* 39 (2), 1952 (45–6). 4 refs. [G.] [Universität Bonn.] O.R.S.

The antibiotic effect of green leaves and leaf litter from different plant species on *Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis* was examined. Results are tabulated. The following groups were distinguished: (1) Plants (including *Acer pseudoplatanus* and *Cercis siliquastrum*) whose green leaves show an antibiotic effect absent in the withered leaf. (2) Plants (including *Carpinus betulus*) in which the antibiotic effect of the leaf decreases as the leaf withers but persists to some extent. (3) Plants (including *Calluna vulgaris, Liriodendron tulipifera* and *Ligustrum vulgare*) in which the antibiotic effect of the leaf is almost as strong in the withered as in the green leaf. (4) Plants (no trees) in which the antibiotic substances in the green and in the withered leaves are different. (5) Plants (no trees) in which the antibiotic effect is greater in the withered leaf. (6) Plants (including *Morus alba*) in which the antibiotic effect is found only in the withered leaf.

161. *Physiology*

See also Nos. 3569–71, 3676–7, 3682, 3697–8, 3701, 3706, 3942, 4072, 4173–4, 4200, 4331

3602. HEIMERDINGER, G. Zur Mikrotopographie der Saftströme im Transfusionsgewebe der Koniferennadel. II. Mitteilung. Entwicklungsgeschichte und Physiologie. **[The microtopography of sap streams in the transfusion tissue of conifer needles. II. History of development and physiology.]** *Planta* 40 (2), 1951 (93–111). 13 refs. [G.g.] O.B.D.

Cf. *For. Abstr.* 10 (No. 923).

3603. KRAMER, P. J., RILEY, W. S., and BANNISTER, T. T. **Gas exchange of Cypress [*Taxodium distichum*] knees.** *Ecology* 33 (1), 1952 (117–21). 8 refs.

A study was made of the O_2 consumption and CO_2 production of Swamp Cypress knees. Both activities were higher for 2–3 days in knees detached from their roots than in controls, but then decreased. Cypress knees possess a relatively large amount of very active cambial tissue, which probably uses most of the O_2 absorbed. It is concluded that little gas exchange occurs between knees and the root systems to which they are attached, and there is no evidence that they play an essential rôle as aerating structures for the roots.

3604. DADYKIN, V. P., and GRIGORJEVA, V. G. O fotosinteze u rasteniĭ Zapoljarjja pri kruglosutočnom osveščeniĭ. **[Photosynthesis in plants growing beyond the Polar Circle with illumination the day round.]** *Dokl. Akad. Nauk SSSR* 80 (2), 1951 (261–3). 7 refs. [Russ.] A.P.B.

Tabulates rates of photosynthesis and degrees of stomatal opening in Birch (*Betula pubescens*) and potatoes under the continuous daylight of the polar region, on the basis of determinations made at various hours on 6–7 July and 7–8 August (Birch), and 13–14 July and 10–11 August (potatoes). In July, photosynthesis in Birch continued and the stomata remained more or less open throughout the light night; in August, however, when the sun began to set once more, photosynthesis practically stopped, and the stomata almost closed, between evening twilight and sunrise. Potatoes, genetically conditioned to short summer photoperiods, behaved quite differently, photosynthesis ceasing and the stomata closing during the night hours, even in the continuously light nights of July.

3605. BERNER, E., JR. **Chlorophyll production by young coniferous plants at different light intensities.** *Årbok, Universitet i Bergen, 1949 (1 Hefte), Naturvitenskapelig Rekke* No. 6, 1950. pp. 32. 22 refs. [E.] L.S.

Two- and 3-year-old plants of *Pinus sylvestris*, *Picea abies* and *P. sitchensis* were grown in beds divided into 4 sections, one of which was unshaded, while the other 3 were shaded with screens admitting 20, 40 and 60% of full daylight respectively. Chlorophyll contents were measured at different times during summer, autumn and winter. Chlorophyll content was found to increase rapidly when light intensity was reduced in summer, at intensities down to 20% of full daylight. Plants shaded in July reached a maximum chlorophyll content in 1–2 months, little further change taking place during autumn and winter. The plants receiving least light reached their maximum chlorophyll content more rapidly than the others. No change in chlorophyll content was found after 6 weeks in Spruce shaded late in the autumn, presumably because of low temperatures. Shaded plants were taller but their stems were weak and less woody. When screens were removed after a year from shaded Spruce, chlorophyll content decreased rapidly; even after 4 months, however, chlorophyll content was highest in the plants which had received least light (20%). Results of removing screens from shaded Pine on 28 July were more complex: chlorophyll content of plants receiving 20% light decreased rapidly until 16 August and then more slowly; that of plants receiving 40 and 60% light decreased until 16 August, increased up to 11 September and then decreased slowly; while that of unshaded controls increased until 11 September and then decreased slowly. The Pine plants that had received 20 and 40% light were in poor condition, with many brown needles, on 9 April 1949, 9 months after the screens had been removed. Chlorophyll contents of the unscreened controls of all 3 species showed little or no distinct seasonal variation.

3606. ŠČERBAKOV, A. P. O raspredelenii èlementov zoly i azota v različnyh organah dvuhletnyh sejancev drevesnyh porod. [**The distribution of ash elements and nitrogen in various organs of two-year-old seedlings of woody plants.**] *Dokl. Akad. Nauk SSSR* 81 (3), 1951 (469–72). 3 refs. [Russ.] A.P.B.

Tabulates and discusses the relative gradients of total ash, N, CaO, MgO, K_2O and P_2O_5 contents of foliage, stem and roots—merely indicating, without actual figures, whether each was greater or less in any one organ than in another—for seedlings of *Quercus robur*, *Fraxinus excelsior*, *Ulmus effusa*, *Larix sibirica*, *Pinus sylvestris* and *Picea abies*, analysed at intervals throughout the period March–October. For all species, these contents varied markedly in the various organs as the growing season proceeded. The maximum content of ash elements was found in the foliage, followed by the roots and then by the stem, but this order was far from constant in individual cases, e.g. for the conifers the maximum usually occurred in the roots—in Pine the whole season long, in Spruce from May to August, and in Larch only up to July, after which the maximum occurred in the foliage. For CaO there were three types of gradient: (1) Ash and Elm—foliage > stem > roots; (2) Oak—foliage < stem > roots; (3) conifers—foliage > stem < roots. For the remaining elements the gradients varied widely both in direction and in the frequency of reversals of direction, with species and time of year.

163. *Embryology*

3607. ALMEIDA, J. L. FERREIRA DE. Polispermia em *Quercus suber* L. [**Polyspermy in *Q. suber*.**] *Agron. lusit.* 13 (3), 1951 (213–9 + 1 plate). 10 refs. [Port.port.e.]

164. *Morphology*

See also Nos. 3654, 3674, 3686–7, 4167.

3608. MUZIK, T. J., and CRUZADO, H. J. **Sausage tree [*Kigelia pinnata*] meristem.** *Rep. fed. Exp. Sta. Puerto Rico* 1951 (13–4).

Describes the process of differentiation of the terminal meristem, and the results of experiments on rooting cuttings.

3609. HALL, B. A. **The floral anatomy of the genus *Acer*.** *Amer. J. Bot.* 38 (10), 1951 (793–9). 12 refs. O.B.D.

Of the species studied, the floral characteristics of *A. negundo* show the highest degree of evolution in being completely dioecious. This supports other evidence that *A. negundo* should be regarded as a separate genus.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 3655, 3686–90, 3693, 3744–9, 3754, 4364, 4433.

3610. STEBBINS, G. L., JR. **Aridity as a stimulus to plant evolution.** *Amer. Nat.* 86 (826), 1952 (33–44). 8 refs. O.R.S.

Where moisture is a limiting factor, xerophytic plant communities possess fewer species than the communities of mesophytic regions, but the number of communities per unit of area is likely to be larger. This promotes geographic separation of species populations and might be expected to speed up evolution. Evidence that certain mesophytic types are derived from xerophytic ancestors is presented for two genera of the Compositae and for certain genera of the subfamilies Mimosoideae and Caesalpinoideae of the family Leguminosae. The evidence in the latter family is derived chiefly from the development of both adult and seedling leaves. *From author's summary.*

3611. ATCHISON, E. **Studies in the Leguminosae. VI. Chromosome numbers among tropical woody species.** *Amer. J. Bot.* 38 (7), 1951 (538–46). 22 refs. O.B.D.

Presents chromosome numbers for 114 species in 55 genera.

3612. CHRISTIANSEN, H. **A tetraploid *Larix decidua* Miller.** *Biologiske Meddelelser, Kgl. Dansk Videnskabernes Selskab, København* 18 (9), 1950. pp. 8 + 4 photos. 7 refs. [E.] O.R.S.

The characteristics of a tetraploid Larch found in the Gisselfeld Estate, Sealand, Denmark, are described.

3613. **The Forest Tree Breeding Station at Ruotsinkylä.** Valtioneuvoston Kirjapaino, Helsinki. 1952. pp. 4. [E.]

3614. DORMAN, K. W. **Hereditary variation as the basis for selecting superior forest trees.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 15, 1952. pp. 88. Many refs.

Surveys existing information in sections on: the basis for hereditable variation; selection in tree improvement; selection for single traits; application of selection to silviculture; plans for selecting superior trees; marking selected trees; and naming improved strains.

3615. STRAND, L. **Progeny tests with forest trees.** *Hereditas, Lund* 38 (2), 1952 (152–62). 3 refs. [E.e.] [Agricultural College of Norway, Vollebekk.] O.R.S.

Formulae are given showing: (1) the relationship between the genotypical value of a parent (or the mean value of several parents) and the mean of n offspring in h replications; and (2) the relationship between future offspring and the mean of the offspring in the experiments. *From author's summary.*

3616. SCHMIDT, H. Die Verzweigungstypen der Fichte (*Picea abies* L.) und ihre Bedeutung für die forstliche Pflanzenzüchtung. **[Branch-habit types in Norway Spruce and their significance in tree breeding.]** *Z. Forstgenet.* 1 (3), 1952 (81–91). 15 refs. [G.g.] [Institut für Forstsamenkunde und Pflanzenzüchtung, München.]

In order to compare the growth characteristics of 'comb' Spruce (Kammfichte) and 'plate' Spruce (Plattenfichte) measurements were taken on trees growing on the same or similar sites in the Swabian foothills. A comparison of average crown cover and stem height and volume increment over a period of 5 years, shows that although the stem increment of individual 'comb'-type trees averages 95% higher than that of the 'plate' type, superiority is not so marked when stem increment is related to crown cover. One ha. of the crown-cover area of 'plate' Spruce would produce an average annual yield of 8·6 cu.m., whereas 'comb' Spruce would produce 9·2 cu.m. When whole stands are considered, therefore, the yield from the 'comb' Spruce is very little greater than that from the 'plate' Spruce, and no considerable increase in yield can be expected from selective breeding of the 'comb' types. [Cf. *For. Abstr.* 6 (155); 11 (No. 2346).]

3617. LÜCKE, H. Züchtungsversuche mit Kiefer (*Pinus silvestris*) und Lärche (*Larix decidua* Miller) in Niedersachsen. **[Selective breeding of *P. sylvestris* and *L. decidua* in Lower Saxony.]** *Z. Forstgenet.* 1 (3), 1952 (74–7). 5 refs. [G.g.]

Describes preliminary experiments made in the selective breeding of élite trees. Choice of trees, and methods of grafting and cross-pollinating for seed production are described.

3618. LANGNER, W. Reziprok unterschiedliches Verhalten von Lärchenbastarden gegen eine Nadelerkrankung. **[Different behaviour of reciprocal hybrids of [European and Japanese] Larch towards a needle disease.]** *Z. Forstgenet.* 1 (3), 1952 (78–81). 7 refs. [G.g.]

Variations in the resistance of Larch hybrids to an unidentified needle fungus are thought to be determined by cytoplasmic influences. *Larix leptolepis* is resistant, and *L. decidua* susceptible, to attack. Hybrids of *L. leptolepis* (♀) × *L. decidua* are resistant, and those of *L. leptolepis* (♂) × *L. decidua* are susceptible. Preliminary observations of *Pinus sylvestris* attacked by *Lophodermium pinastri* show a similar pattern of behaviour in the progeny of resistant and non-resistant strains.

3619. ZOBEL, B. **The natural hybrid between Coulter and Jeffrey Pines.** *Evolution* 5 (4), 1951 (405–13). 7 refs. [University of California.] O.R.S.

Hybrids and parents from 5 areas were analysed, using 12 characteristics of cones, seeds, foliage and oleoresins as the index of hybridization. Natural hybridization was rare, but examples were found in all 5 geographic areas studied, generally in districts where *P. coulteri* greatly outnumbers *P. jeffreyi*. In one area introgression was found proceeding into both parental species, but elsewhere only into *P. coulteri* populations; all intergrades are formed from intermediate to typical *P. coulteri*. The rarity and localization of the hybrids suggest that hybridization and consequent introgression have little evolutionary significance. [Cf. *For. Abstr.* 12 (No. 961).]

3620. JOHNSON, A. G. **Spontaneous White Pine hybrids.** *J. Arnold Arbor.* 33 (2), 1952 (179–87). 6 refs.

Describes the following:—(1) × *Pinus hunnewelli* (*P. strobus* × *P. parviflora*). The hybrid displays marked heterosis, and is promising as an ornamental. It is partially fertile and readily propagated by grafting. (2) A possible hybrid between *P. peuce* and *P. parviflora*.

3621. GUERREIRO, M. GOMES. Alguns estudos no género *Castanea*. Relatório. **[Studies on *Castanea*. A report.]** *Publ. Serv. flor. aqüic. Portugal* 15 (1/2), 1948 (113–35). [Port.e.] [Estação de Experimentação Florestal do Sobreiro, Alcobaça.]

A report of work on *Castanea* carried out at the Alcobaça Forest Experiment Station during 1947, with particular reference to experiments in the hybridization of *C. crenata* var. *tamba* and *C. sativa*, and vegetative propagation. [Cf. *For. Abstr.* 13 (Nos. 3792–3).]

3622. POOLE, A. L. **Hybrid Southern Beeches.** *N.Z. J. For.* 6 (3), 1951 (250–3).

Records (1) an artificial hybrid, *Nothofagus solandri* × *N. fusca*, and (2) seedling populations grown from an apparent natural hybrid, *N. cliffortioides* × *N. fusca*.

3623. BARTLETT, H. H. **Regression of × *Quercus deamii* toward *Quercus macrocarpa* and *Quercus muhlenbergii*.** *Rhodora* 53 (635), 1951 (249–64 + 5 plates). 6 refs. O.B.D.

Attempts to demonstrate from a study of the hybrid and of its progeny, and from a review of literature, that the White Oak hybrid × *Quercus deamii* is probably *Q. macrocarpa* × *Q. muehlenbergii* rather than *Q. alba* × *Q. muehlenbergii*, as previously supposed, and that the hybrid shows a definite regression towards the parents.

3624. HOUTZAGERS, G. **Forest genetics and Poplar breeding in the Netherlands. I. The difference**

between breeding work in forestry and agriculture or horticulture. *Euphytica* 1 (1), 1952 (10–4). 7 refs. [E.du.] O.R.E.

3625. GREHN, J. Über Spaltungserscheinungen und photoperiodische Einflüsse bei Kreuzungen innerhalb der Sektion *Populus* Leuce Duby. [**Segregation and photoperiodic influences in crosses within *Populus* Section *Leuce*.**] *Z. Forstgenet.* 1 (3), 1952 (61–9). 20 refs. [G.g.] [Bundesanstalt für Forst- und Holzwirtschaft, Schmalenbeck.]

Progeny from crosses of two different *Populus canescens* (♀) with *P. tremula* of varying provenance proved to be of two distinct types: (1) normal, with good growth characteristics and survival, and (2) dwarfs, with poor survival. Crosses of *P. nigra* (♂) with *P. canescens* gave similar results. Dwarf progeny also resulted from crosses of *P. tremula* with *P. tremula*, in which one parent came from northern Sweden. In these, dwarfing is attributed to photoperiodic disturbances arising from the dependence of one parent on protracted daylight. In the other cases, however, dwarfing seems to be the direct result of hereditary factors. The normal plants exhibit a promising hybrid vigour.

3626. BUGAŁA, W. Dotychczasowe wyniki hodowli topoli w Kórniku. [**Results to date of the breeding of Poplars at Kórnik [Poland].**] *Sylwan* 96 (1), 1952 (31–41). [Pol.]

Work has been in progress since 1949 with Poplars representing 28 species, 33 hybrids, and some 40 varieties, the trees being mostly 15–25 years old. The following methods of hybridization are used: (1) crossing on growing trees: the ♀ flowers are bagged and pollinated with selected pollen; (2) crossing on cut branches (Wettstein's method); and (3) grafting, using 1-year-old seedlings as stock and approach-grafting twigs with ♀ flower buds. Several hybrids within the section *Leuce*, and between *Leuce* Poplars and Poplars of the sections *Aigeiros* and *Tacamahaca*, are described, as well as hybrids of *P. wobstii*, *P. berolinensis*, *P. maximowiczii*, and *P. nigra* var. *italica*.

3627. BUGAŁA, W. Kilka nowych odmian i mieszańców *Populus alba* L. [**Some new varieties and hybrids of *P. alba*.**] *Repr.* from *Acta Soc. Bot. Polon.* 22 (1/2), 1951 (43–57). 5 refs. [Pol.e.]

Describes, with illustrations, examples of *P. alba* var. *angustifolia*, *P. alba* var. *macrophylla*, × *P. canescens* var. *pyramidalis* and × *P. rogalinensis* (probably a hybrid *P. tremula* × *alba*) from the Arboretum at Kórnik.

3628. Prostý způsob generativního křiženi topolů. [**A simple method of Poplar hybridization.**] *Čsl. Les.* 31 (12), 1951 (274–5). [Cz.]

Describes experiments on the crossing of Balsam and Black Poplars, conducted early in 1950 in hothouses of the Brno Forest Research Institute. Twigs with flower buds were cut in the first half of February and put into glass bottles with water or nutrient solution. It was found advantageous to thin the ♀ flowers on catkins after pollination. The development of flowers of both sexes should be controlled by temperature so as to make the ♂ flowers ripen earlier than the ♀ ones. Before pollination, the air in the hothouse should be humid; later, before the ripening of the pollen and of the seeds, it should be dry. Pollination was effected either by spraying or by brush. The ripe seeds were sown in flower-pots under glass covers. When the first true leaves appeared, the seedlings were transferred to larger pots, and then into a hotbed or open soil. A typical time-table is: twigs placed in hothouse 20 February; catkins open 8 March; stigmata develop in ♀ flowers, 12 March; pollination, 14–17 March; seed collection and sowing, 29 April–8 May; first pricking out, 30 May; transplanted to hotbed, 3 July.

168. *Histology*

See also Section 811.

3629. LOEWENBERG, J. R., and SKOOG, F. **Pine tissue cultures.** *Physiol. Plant., Copenhagen* 5 (1), 1952 (34–6). 10 refs. [E.e.] [Department of Botany, University of Wisconsin.]

A method and media for obtaining callus and maintaining growth of tissue cultures of *Pinus banksiana* and *P. strobus* are described. A heat-labile factor present in malt and Pine seed appears to be essential for the growth of *P. banksiana* cultures. *Authors' summary.*

3630. JACQUIOT, C. Sur les phénomènes d'histogenèse observés dans des cultures *in vitro* de tissu cambial de chênes (*Quercus sessiliflora* Sm., *Quercus pedunculata* Ehr., *Q. suber* L.). [**The phenomena of histogenesis observed in cambial tissues cultivated *in vitro*, from *Q. sessiliflora*, *Q. pedunculata* and *Q. suber*.**] *C.R. Acad. Sci., Paris* 234 (14), 1952 (1468–70). 1 ref. [F.] O.R.S.

The cambial tissue of these three species continued for some considerable time to form phloem of normal structure.

17. SYSTEMATIC BOTANY

172.6. Algae

See No. 3569.

172.8. Eumycetes (True Fungi)

See Nos. 3568–71, 3971 *et seq.*, 4052, 4058, 4330 *et seq.*

172.9. Lichens

3631. BALABÁN, K. Lesnicky významné lišejníky. [**Lichens important in forestry.**] *Lesn. Práce* 30 (2), 1951 (107–33). 15 refs. [Cz.]

Brief general account, followed by a description of genera and species of lichens found in the forests of Czechoslovakia.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

3632. LHOAS, J. Liste alphabétique des noms vernaculaires, noms communs et scientifiques des arbres et arbrisseaux du Katanga. [**Alphabetical list of the vernacular, common, and scientific names of the trees and shrubs of Katanga.**] Comité spécial du Katanga, Elisabethville. 1948. pp. 208 + blank pages for notes. [F.]

3633. **Approved tree name abbreviations.** *Special Supplement* to *For. Chron.* March, 1952 (62–7).

This list of abbreviations, for maps, reports etc. has been adopted as standard by the Canadian Institute of Forestry. Abbreviations consist of a combination of small and capital letters, e.g. yB = Yellow Birch, yuB = Yukon Birch, Be = Beech etc.

3634. HILDEBRAND, F. H. Preferente namen voor belangrijke Indonesische boomsoorten. [**Preferred names for important Indonesian tree species.**] *Bijz. Publ. Bosbouwproefsta. Bogor* No. 6, 1952. pp. 25. [Jav.Du.E.]

Tabulates for 400 species (about 10% of the total number of Indonesian species), arranged under family and genus, the vernacular name proposed as standard for Indonesia, plus distribution, sp. gr. and durability class. It is emphasized that these proposed names cannot be considered as final until further work has been done.

3635. HILDEBRAND, F. H. Verbeterde boomnamenlijst van de westerafdeling van Borneo. [**Revised list of tree species collected in west Borneo.**] *Rapp. Bosbouwproefsta. Bogor* No. 54, 1952. pp. 82. [Jav.Du.E.]

The list is in two parts, arranged (1) by vernacular names, and (2) under family, genus and species. Each gives the vernacular name, its language or dialect, the scientific name, and durability class of the wood. [Cf. *For. Abstr.* 13 (Nos. 1888–90).]

3636. POKORNÝ, J. Semenačky drevin. [**Tree seedlings.**] *Lesn. Práce* 30 (1), 1951 (47–77 + 11 plates). [Cz.]

Includes a key for identifying seedlings of coniferous and broadleaved genera and some species likely to be used in shelterbelts in Czechoslovakia, with detailed illustrated descriptions of seedlings of 27 conifers and 86 broadleaved species.

3637. PARDY, A. A. **Notes on indigenous trees and shrubs of Southern Rhodesia.** *Reprs.* from *Rhod. agric. J.* 48 (5; 6), 1951 (396 . . . 406 + 21 photos; 500 . . . 510 + 20 photos); 49 (1), 1952 (6 . . . 16 + 11 photos).

Carissa edulis, Albizzia antunesiana, Brachystegia spiciformis, Baikiaea plurijuga, Acacia campylacantha, A. sieberiana, Cassia singueana, Dombeya rotundifolia, Heeria reticulata, Lannea discolor, Monotes glaber, Pseudolachnostylis maprouneifolia, Cussonia kirkii, C. spicata, Ochna pulchra, Acacia galpinii, Albizzia sericocephala, and *Brachystegia boehmii*. [Cf. *For. Abstr.* 13 (No. 1886).]

3638. CUATRECASAS, J. **Contributions to the flora of South America. Studies on Andean Compositae—II. Studies in South American plants—III.** *Fieldiana* (*Bot.*) 27 (2), 1951. pp. 113.

Part II includes some new woody species; Part III includes many, in the Brunelliaceae, Violaceae, Aquifoliaceae, Celastraceae, Sapindaceae, Lecythidaceae, Loganiaceae, Connaraceae and Rosaceae.

3639. FRAGA, M. V. G. Ensaio de índice da flora dendrológica do Brasil. [**A tentative classified list of Brazilian tree species.**] *Arq. Serv. flor., Brasil* 3, 1947 (113–97). 23 refs. [Port.]

Cf. *For. Abstr.* 10 (No. 89).

3640. PICKEL, D. B. José. As principais árvores que dão madeira. (Método prático para o seu reconhecimento). [**Practical means of identifying the most important timber trees.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (158–87). [Port.e.]

Botanical descriptions, with illustrations, of 14 Brazilian species.

3641. MACBRIDE, J. F. **Flora of Peru.** *Bot. Ser. Field Mus. nat. Hist.* 13 (Pt. 3*a*, No. 1), 1951 (1–288 + ii).

Cf. *For. Abstr.* 11 (No. 897).

3642. AUDAS, J. W. **The Australian bushland.** W. A. Hamer Pty. Ltd., 205–217 Peel Street, North Melbourne, Victoria. 1950. pp. 712 + numerous plates. L.S.

This extensive botanical study of the Australian flora treats separately the flora of the individual states, with detailed reference to botanical excursions in Victoria. Chapters on Australian trees and their uses, on Australian Pines, and on Australian fodder shrubs and grasses are included.

3643. KRAEMER, J. H. **Trees of the western Pacific region.** Tri-State Offset Company, 817 Main Street, Cincinnati 2, Ohio. 1951. pp. 436. 76 refs.

Covers 178 species from S.E. Asia bordering on the Pacific Ocean and S. China Sea and from the islands of the Western Pacific, giving local names, and descriptions of the trees and timbers, with notes on distribution. Includes separate sections on thatching materials, on strength of wood with tables showing strength properties of Philippine timbers, and on durability.

174.2. Gymnosperms

See also Nos. 3619–20, 4160, 4166.

3644. EMBERGER, L. La position systématique de *Ginkgo biloba*. [**The systematic position of *G. biloba* [in relation to living and fossil plants].**] *C.R. Acad. Sci., Paris* 229 (20), 1949 (960–3). 7 refs. [F.] O.R.S.

3645. ROE, E. I. **Balsam Fir in Minnesota—a summary of present knowledge.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 13, 1950. pp. 25. 83 refs.

Includes sections on area, volume and consumption of *Abies balsamea*, silvicultural characteristics, growth and yield, felling practices and additional studies needed.

3646. LI, H.-L. **The genus *Amentotaxus*.** *J. Arnold Arbor.* 33 (2), 1952 (192–8).

A taxonomic study, with a key to the species.

3647. GARDEN, J., and JOHNSON, L. A. S. ***Microstrobos*, a new name for a Podocarpaceous genus.** *Contributions from the New South Wales National Herbarium, Sydney* 1 (6), 1950 (315–6). 4 refs. L.S.

The new genus *Microstrobos* is erected to cover *M. niphophilus* sp. nov. (= '*Pherosphaera hookeriana* Archer' of Hook. f.) and *M. fitzgeraldi* (= *Dacrydium fitzgeraldi*). *Pherosphaera hookeriana* Archer, non Hook. f., is *Microcachrys tetragona*.

175.2. Monocotyledons

3648. DYER, R. A. **A note on the distribution of the Palms of South Africa, with special reference to *Borassus* in the Transvaal.** *S. Afr. J. Sci.* 48 (7), 1952 (215–20). 20 refs. A.P.B.

176.1. Dicotyledons

See also Nos. 3609–10, 3622–3, 3626–7, 3665, 3691, 4164, 4167–8.

3649. AZAMBUJA, D. DE. Contribuição ao conhecimento das Apocynaceae encontradas no Brasil. [**The Apocynaceae of Brazil.**] *Arq. Serv. flor., Brasil* 3, 1947 (9–112 + 35 plates). 65 refs. [Port.]

A taxonomic study, with a key to the species, a list of synonyms, and notes on the uses of certain species.

3650. WOODS, F. W. **The genus *Ilex* in Tennessee.** *Rhodora* 53 (634), 1951 (229–40). O.B.D.

3651. SILLANS, R. *Tisserantodendron* (Bignoniacées), genre nouveau du Centre Africain. [***Tisserantodendron* (Bignoniaceae), a new genus from Central Africa.**] *Bull. Soc. bot. France* 98 (7/9), 1951 (270–2). [F.] O.B.D.

The new genus is placed in the tribe Tecomeae, and has affinities with *Stereospermum* and *Radermachera*. The type species, *Tisserantodendron chevalieri*, is a tree about 20 m. high, found in scattered localities in rain forest.

3652. KUHLMANN, J. G. Notas sôbre *Capparis nectaria* Vell. [**Notes on *C. nectaria*.**] *Arq. Serv. flor., Brasil* 4, 1950 (3–4 + 1 plate). [Port.]

3653. SMITH, A. C. **Studies of Pacific Island plants, XII. The Cunoniaceae of Fiji and Samoa.** *J. Arnold Arbor.* 33 (2), 1952 (119–49).

3654. RIBEIRO, J. PINTO, and GUERREIRO, M. GOMES. Acerca do uso da análise discriminatória. Comparação entre duas castas de castanhas. [**The use of discriminant analysis. Comparison of two Chestnut clones.**] *Publ. Serv. flor. aqüic. Portugal* 15 (1/2), 1948 (137–51 + 1 plate). 8 refs. [Port.e.]

Presents an example of analysis of differentiation in two Chestnut clones, on the basis of length and width of fruits, by use of the discriminant function of these measurements.

3655. YOUNGMAN, B. J. **Professor Naonori Hirota's work on Camphor trees.** *Kew Bull.* 1952 (1), (61–5).

A brief review of work as yet unpublished, which includes a new scheme of classification of *Cinnamomum camphora* (based on differences in morphology and in the composition of the oil), and a study of the distribution of the varieties and their genetic constitution.

3656. VERDOORN, I. C. **South African species of *Acacia* with glandular glutinous pods.** *Bothalia* 6 (1), 1951 (153–60).

Discusses the taxonomy of the group (i.e. *Acacia tenuispina, A. borleae, A. permixta, A. nebrownii, A. swazica*), describes a new species, *A. exuvialis*, and presents a distribution map of the group.

3657. LÉONARD, J. J. G. **Note sur les genres paléotropicaux *Afzelia, Intsia* et *Pahudia*** (Legum.-Caesalp.). [**Note on the palaeotropical genera *Afzelia, Intsia* and *Pahudia*.**] *Reinwardtia, Bogor* 1 (1), 1950 (61–6). 19 refs. [F.e.] L.S.

Intsia is a valid genus, but the others are synonyms. *Afzelia* is the nomen conservandum. A list of all species of *Afzelia*, with new combinations, is presented.

3658. LÉONARD, J. Notulae systematicae. XI. Les *Cynometra* et les genres voisins en Afrique tropicale. [***Cynometra* and related genera in tropical Africa.**] *Bull. Jard. bot. Brux.* 21 (3/4), 1951 (373–450). 57 refs. [F.] O.B.D.

A systematic study of *Cynometra, Brachystegia, Cryptosepalum, Gilletiodendron, Hymenostegia, Lebruniodendron, Loesenera, Macrolobium, Monopetalanthus, Neochevalierodendron, Plagiosiphon, Schotia, Scorodophloeus, Talbotiella*, and *Zenkerella*.

3659. MERRILL, E. D. **Notes on *Xanthostemon* F. Mueller and *Kjellbergiodendron* Burret.** *J. Arnold Arbor.* 33 (2), 1952 (150–65).

3660. MARTÍNEZ, M. Las Casimiroas de México y Centroamérica. [**The genus *Casimiroa* in Mexico and Central America.**] *An. Inst. Biol. Univ. Méx.* 22 (1), 1951 (25–81). [Span.] C.G.B.

A review of the genus, describing a new variety and some new forms, and including a key.

3661. DUCKE, A. As maçarandubas amazônicas. [**The Amazonian species of *Manilkara*.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (231–44). [Port.]

Includes a key to the species, with botanical descriptions and notes.

3662. KOBUSKI, C. E. **Studies in the Theaceae, XXVI. The genus *Visnea*.** *J. Arnold Arbor.* 33 (2), 1952 (188–91).

18. PLANT ECOLOGY

See also No. 3724.

3663. OPPENHEIMER, H. R. **Geobotanical research in Palestine 1938–1950.** *Vegetatio* 3 (4/5), 1950 (1952), (301–20). Numerous refs. A.P.B.

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 3645, 3725, 3739, 4160–1, 4406–7, 4429, 4433.

3664. **Ecology of American forest species, erosion and reafforestation.** *OEEC Documentation, Paris* 1952. pp. 259 + 52 photos. 205 refs.

The report of the OEEC Technical Assistance Mission No. 18 to the U.S.A. It covers three subjects: (1) the growing conditions of American species which are already known in Europe, or which might be introduced into Europe (pp. 13–148); (2) the reforestation of semi-desert and fallow land under difficult climatic conditions (pp. 149–186); and (3) field and laboratory investigations on soil erosion in

forest areas and the preventive measures to be employed (pp. 187–238).

3665. MINTZER, M. G. Yuchan o palo borracho (*Chorisia insignis* H. Kth.). [***Chorisia insignis.***] *Alm. Minist. Agric. Argent.* 26/27, 1951/52 (185–90). [Span.] A.P.B.

Three forms of *Chorisia insignis* exist in north-western Argentina: (1) That found at high altitudes, under intense insolation, possesses leaves with a protective reddish pigment; it is a tree of medium height, will grow in shallow, permeable soils, and will tolerate temperatures as low as – 5° C. (2) A form that grows in high forest at low altitudes and reaches 10 m. in height; this form prefers more shaded sites, but will tolerate permeable soils and more open sites. (3) A form that thrives in the San Francisco (Salta) valleys, reaches 18 m. in height, and requires a tropical climate and deep soils rich in humus. Instructions are given for propagation either from seed or cuttings, and data on the properties of the seed fibre and seed oil are presented. The tree would offer definite commercial possibilities if grown in plantations.

3666. HORVAT, A. O važnosti uzgoja lovora. [**The importance of growing *Laurus nobilis***.] *Šum. List* 75 (12), 1951 (392–5). 15 refs. [Croat.it.]

A general account of the distribution and silvicultural characters of the Bay tree based on Jugoslavian, Austrian, German and Italian literature. Seed should be obtained from picked and not from fallen fruit, since the latter has often begun to ferment before collection, which reduces its viability.

3667. KADAMBI, K. ***Morus laevigata*, Wall.** *Indian For.* 78 (4), 1952 (176–87). 36 refs.

Distribution, silvicultural characters, silviculture, and wood properties.

3668. MILLENER, L. H. **A study of *Entelea arborescens* R. Br. ('Whau'). Part I. Ecology.** *Transactions and Proceedings of the Royal Society of New Zealand, Wellington* 76 (3), 1947 (267–88 + 3 plates). 13 refs. L.S.

Entelea arborescens is found in New Zealand from the North Cape to Nelson near the sea coast. It is a strong light demander and therefore occurs only sporadically in the primitive coastal forest. In open sites it is unsurpassed in vigour and often plays a vital rôle in plant succession, but it is intolerant of even moderately cold, strong winds, and of a very dry or ill drained substratum. In the early stages of man's interference with coastal forests it spreads rapidly. When interference is prolonged or initially severe, it is exterminated. In lowland rain forest it is rare, being found so far only by streams in broad, open valleys near the coast, where open ground and sufficient warmth and light are found. It is sometimes destroyed by browsing, but only when normal food supplies are low. In its natural habitat the tree depends for success mainly upon its prodigious seed production, the remarkably prolonged viability of the seeds and its rapid growth after germination. The seed is very resistant to fire, which stimulates germination. *From author's summary.*

181.1. Distribution, Natural Range

See also Nos. 3594, 3648, 3650, 3655, 3691.

3669. BROWICZ, K. Próba statystyki klasy iglastych. [**An experiment in statistics on Coniferae.**] *Acta Soc. Bot. Polon.* 20 (2), 1950 (523–48 + 2 maps). 60 refs. [Pol.e.] [Institute of Forest Botany, Poznań University.] C.G.B.

On the basis of literature and of the author's own research, tables are presented showing (*a*) for each continent, the genera occurring in it, and (*b*) for each genus, the continents in which it occurs. Maps are given showing the densities of the families Taxaceae, Podocarpaceae, Araucariaceae, Cephalotaxaceae, Taxodiaceae, Pinaceae, and Cupressaceae. On the basis of these figures and maps the geographical centres of the different families are indicated. A further table gives the number and % of the genera and species occurring in the separate continents. A Chinese centre is shown to be the richest in coniferous species. *From author's summary.*

3670. GULISAŠVILI, V. Z. Rasprostranenie lesoobrazujuščih hvoïnyh porod v Zakavkazje i vzaimootnošenija meždu nimi. [**Distribution of forest-forming coniferous species in Transcaucasia and their interrelations.**] *Bot. Ž.* 36 (3), 1951 (277–87). 15 refs. [Russ.] I.M.I.

Discusses, with sketchmaps, the horizontal and vertical distribution of Spruce (*Picea orientalis*), Fir (*Abies nordmanniana*), and Pine (*Pinus sylvestris* var. *hamata* (*P. hamata*)) in western Transcaucasia (mainly Georgia) and eastern Transcaucasia (including northern Armenia) with reference to their climatic requirements and past history in this region. Spruce and Fir occur mainly, and form considerable blocks of forest, in the west of the region, while Pine occurs mainly in the east, forming fairly large forests in some places. The lower (xeric) altitudinal limits of Pine, Spruce and Fir rise from respectively ca. 200, 300 and 400 m. in the westernmost part of Georgia to ca. 700, 800 and 900 m. in the easternmost corner of eastern Transcaucasia. The cause of the disappearance of Spruce forests from eastern Transcaucasia, where this species spread almost down to sea level during the Tertiary period, is probably to be looked for in the climatic changes of the glacial and post-glacial periods. Pine forests, formerly much more extensive, now persist as large, more or less pure blocks chiefly in areas having a pronounced continental climate. Elsewhere they have been displaced by other species. In the east, this has occurred fairly recently as a result of the clear felling of stands with an admixture of hardwoods, coppice growth from which has made natural regeneration of the Pine difficult or impossible. In the west, with a moist maritime climate, the replacement of Pine by Spruce/Fir appears to be the natural succession. In both regions it maintains itself on steep slopes with shallow, stony soils, where competition from other species is not effective.

3671. ACATAY, A. **Bozdağ sedirleri ve doğu kızılağacı hakkında bazı tesbit ve müşahedeler. [*Cedrus libani* and *Alnus orientalis* on the**

Bozdağ range.] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (2), 1951 (87–96 + 8 photos, 1 gph.). [Turk.g.]

Discusses the distribution of the two species and describes the botanical characteristics of *C. libani* in the area.

3672. ACATAY, A. Memleketimiz ormanlarında bulunduğu tesbit edilen *Betula medwedewi* Rgl. (det. Rechinger). [**The range of *B. medwedewi* in Turkey.**] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (1), 1951 (212–4 + 2 plates). [Turk.g.]

3673. AIRY SHAW, H. K. **On the distribution of *Pisonia grandis* R. Br. (Nyctaginaceae), with special reference to Malaysia.** *Kew Bull.* 1952 (1), (87–97). 51 refs.

The distribution of *Pisonia grandis* is unusual in that it ranges over a number of scattered islands from the Indian Ocean to the western Pacific. The author outlines a theory that a supply of bird guano may be necessary for the germination and early development of the species, though not all the facts support this theory. Some notes on nomenclature and taxonomy are included.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 3557, 3562, 3604–5, 3625, 3682, 3706, 3739 *et seq.*, 3942.

3674. GIACOBBE, A. L'ecologia dell'abete bianco appeninico. I. Morfologia e biologia. [**The ecology of the Appenine race of *A. alba*. I. Morphology and biology.**] *Repr.* from *Rendiconti dell'Accademia Nazionale dei Lincei, Roma* (*Ser. 8*) 6 (3), 1949 (339–42). [It.]

Cf. *For. Abstr.* 13 (No. 2817).

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 3574 *et seq.*, 3603, 3610, 3683, 3750, 3949, 3959.

3675. COOPER, G. R. **Response of the Black Locust, *Robinia pseudoacacia* L., to environmental factors.** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 26 (2), 1952 (189–91). O.R.E.

From a study of a number of plantations it is concluded that planting sites for Black Locust in southern or eastern Iowa have the following characteristics: The macropore space should be not less than 10% in the first 12 in. of soil and should be continuous for 24–36 in., which facilitates drainage. The planting site should not be subject to flooding; it should be sheltered, but not so placed that cold air will flow in and accumulate. The soil should have a reasonably high field capacity but not a high wilting %.

3676. WRABER, M. Zum Wasserhaushalt von *Quercus coccifera*. [**The water economy of *Q. coccifera*.**] *Vegetatio* 3 (4/5), 1950 (1952), (266–78). 10 refs. [G.] A.P.B.

A free translation of an article in *Jahrbuch der naturwissenschaftlichen Gesellschaft in Ljubljana*, 1943.

3677. OPPENHEIMER, H. R. **The water turn-over of the Valonea Oak.** *Palest. J. Bot.* (*R. Ser.*) 7 (1/2), 1949 (177–9). E.M.B.

A very high rate of transpiration was observed in *Quercus ithaburensis*, even after the dry season. Apparently the tree finds sufficient moisture throughout the summer, if adequately spaced, and this is probably the reason for its scattered distribution. Its free-growing habit must be taken into account when sowing in mixture or planting Pines between old Oaks.

3678. READ, R. A. **Tree species occurrence as influenced by geology and soil on an Ozark north slope.** *Ecology* 33 (2), 1952 (239–46). 16 refs. [Southern Forest Experiment Station, New Orleans.]

3679. ŠAFAR, J. O gospodarskom značenju podzemnih organa sadnica i drveća. [**Significance in forest management of the roots of plants and trees.**] *Šum. List* 75 (11), 1951 (363–73). [Croat.g.]

A survey of Jugoslavian and foreign papers on the shape, size and development of roots, published since 1870, is followed by an account of two personal studies: (1) In 1951, many Oak, Poplar, and Ash trees, and some Lime, Elm, Maple, Hornbeam, and Alder, were blown down in the floodland forests along the river Sava. The root systems were investigated of 35 *Quercus robur*, and partially of 34 Ash and 26 Poplar trees, and 1 tree each of the other species mentioned. It was found that practically none of these trees had any tap root. The Oak root systems had no great spread but a very dense and ramifying network of numerous thin rootlets, seldom going down further than 1·8–2 m. The diameter of the root system increased with d.b.h. at a greater rate than its depth (e.g. for the d.b.h. class 20–30 cm., the depth of the root system was 1·2 m., and its width 3·0 m., while for the 71–80 cm. class the respective figures were 1·9 and 5·8 m.). The root systems of Ash and Poplar were of much the same depth as the Oak's, but of the 'extensive' type, while that of the Oak was of the 'intensive' type. It is inferred that better use is made of the soil in mixed, uneven-aged Oak stands than in pure even-aged ones. (2) In a Fir/Spruce/Beech stand which appeared to be growing on a good, deep soil, the root system of the Fir was ca. 8–12 m. wide, but only 0·7–1 m. deep (rarely to 1·5 m.), and the soil was actually very shallow and stony beneath. On such sites windthrow after selective fellings or thinnings can be severe, and it is evidently advisable to base felling practice on proper investigation of root systems.

3680. LARUE, C. D. **Root-grafting in tropical trees.** *Science* 115 (2985), 1952 (296).

A cursory examination of trees on and near the Federal Experiment Station at Mayagüez, Puerto Rico, showed that natural root grafting was present in trees of 34 genera belonging to 18 different families.

3681. LEVISOHN, I. **Forking in Pine roots.** *Nature, Lond.* 169 (4304), 1952 (715). 3 refs.

In some experiments carried out at Bedford College, pots carrying Scots Pine seedlings were fitted into the necks of earthenware jars. The roots of

the seedlings growing from the bottom of the pots formed a root system in the leaching water that collected in the containers. Irrespective of the type of potting soil used, the root system developing in the leaching water showed (1) rich forking of the short roots when the seedlings in the pots had formed mycorrhizae, and (2) no forking when the seedlings in the pots possessed no mycorrhizal associations. None of these container roots showed any trace of mycorrhizal or other infection. It would appear that the forking is induced by exudates of the mycorrhizal fungi in the potting soil washed into the containers. A further point of interest is that in some experiments using plants with intracellular (haustorial) infection the container roots were forked and possessed infection of the haustorial type. [Cf. *For. Abstr.* 12 (No. 109).]

3682. WASSINK, E. C., and RICHARDSON, S. D. **Observations on the connection between root growth and shoot illumination in first-year seedlings of *Acer pseudoplatanus* L. and *Quercus borealis maxima* (Marsh) Ashe.** *Repr.* from *Proceedings, Koninklijke Nederlandsche Akademie van Wetenschappen* (*Ser. C*), *Amsterdam* 54 (5), 1951 (503–10 + 2 photos). 17 refs. [E.e.]

First-year seedlings of both species were grown in gravel in glass-fronted boxes for root observation under controlled conditions of light and temperature. The influence on root growth of light intensities of between 250 and 9500 luxes, for 16 hr./day at 23° C., was observed. Rate of root growth of *A. pseudoplatanus* is directly related to light intensity and seems, therefore, to be determined by conditions for photosynthesis. The equilibrium rate of root growth of *Q. borealis*, which is consistently higher than that of *A. pseudoplatanus*, was constant at all intensities, and appears to depend on storage material rather than on direct photosynthesis. A change of intensity in either direction produced a sudden decrease in root growth rate for Oak, but this was quickly followed by an increase to the previous level.

181.4. Reaction to Biotic Influences (Competition, etc.) and Fire

See also Nos. 3685, 3956–7, 3959, 3991.

3683. STRØMSØE, B. **Litt om sterilsoner og gruppforyngelse under skjerm. ['Sterile' zones and group regeneration under shelterwood.]** *Tidsskr. Skogbr.* 60 (3), 1952 (72–9). 7 refs. [Nor.]

Discusses the sterile zones that occur round seed trees on poor Pine soils, where seedlings remain dwarfed as the result of root competition, and the groups of trees that develop from them, protected by the presence of the seed tree from snow blight [*Phacidium infestans*?], are released from root competition by the felling of neighbouring trees.

3684. LEIBUNDGUT, H. **Flechtenrasen als Hindernis für die Ansamung. [Lichen layers as an obstacle to natural regeneration.]** *Schweiz. Z. Forstw.* 103 (4/5), 1952 (162–8). 2 refs. [G.f.]

It was observed in the Swiss National Park that forest species regenerated badly on areas where the forest floor was covered with lichens. Laboratory tests were made with sowings of uncovered seed of *Pinus sylvestris*, *P. mugo*, and *Picea abies*, watered with (1) rainwater, (2) rainwater + lichen extract, and seed of the same species covered with (3) commercial peat, (4) ground-up lichen, both watered with rainwater. Treatments had no significant effect on germination, but a highly significant effect on chlorophyll content of seedlings and type of mycorrhiza developed.

181.5. Reproductive Behaviour

See also Nos. 3636, 3683–4, 3731 *et seq.*, 3751 *et seq.*, 3958.

3685. U NE WIN. **A note on Kyathaung (*Bambusa polymorpha*) flowering in Pyinmana Forest Division.** *Burmese For.* 1 (2), 1951 (52–6).

Describes the gregarious flowering of *B. polymorpha* which started about 1934, and the measures taken to secure regeneration of Teak and Pyinkado (*Xylia dolabriformis*). Direct sowing was a failure, and planting was expensive, but where there were sufficient seed trees, ample natural regeneration eventually appeared. The course of events seemed to be as follows: In the first rains after flowering, a very light carpet of Bamboo seedlings appeared, but this was wiped out in the 2nd or 3rd rains by a thick growth of *bizat* (*Eupatorium odoratum*); 3 or 4 rains after flowering the whole forest was a sea of *bizat* with Teak and some Pyinkado showing up here and there. By the time that the Teak had reached a height of 20–30 ft., Bamboo seedlings began to appear again and gradually grew up through and eventually suppressed the *bizat*. The *bizat* appears to perform a useful rôle in giving the Teak a start of the Bamboo, and also in preventing fires on the forest floor for several years after flowering of Bamboo.

3686. ROHMEDER, E. **Untersuchungen über die Verteilung der Geschlechter bei den Blüten von *Fraxinus excelsior*. [Sex distribution in flowers of *F. excelsior*.]** *Forstwiss. Cbl.* 71 (1/2), 1952 (17–29). [G.g.] [Institut für Forstsamenkunde und Pflanzenzüchtung in München.]

Cf. *For. Abstr.* 8 (No. 98).

3687. SEITZ, F. W. **Zwei neue Funde von Zwitterigkeit bei der Aspe. [Two new examples of hermaphroditism in Aspen.]** *Z. Forstgenet.* 1 (3), 1952 (70–3). 11 refs. [G.g.] [Bundesanstalt für Forst- und Holzwirtschaft, Schmalenbeck.]

Reports two examples found on *Populus tremula* in southern Germany and compares them with those found by Runquist in northern Sweden [cf. *For. Abstr.* 13 (No. 1043)]. Progeny from selfing have been raised in both cases; their importance in breeding Aspen is discussed.

3688. WRIGHT, J. W. **Pollen dispersion of some forest trees.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 46, 1952. pp. 42. 32 refs.

Pollen was collected at varying distances from isolated source trees, occurring either singly or in groups. Species examined were *Ulmus americana*, *Populus deltoides*, *P. nigra* var. *italica*, *Fraxinus pennsylvanica* var. *lanceolata*, *F. americana*, *Pseudotsuga taxifolia*, *Picea abies*, *Pyrus malus*, *Cedrus*

atlantica var. *glauca*, *C. libani* and *Pinus cembra* var. *edulis*. Results showing frequency and distance from source are given in graphs. The species with the shorter dispersal range (Ash, Cedar, Douglas Fir, Pinyon Pine and Spruce) were, with the exception of Ash, those with larger pollen grains and more rapid rates of fall. With the Cedars, pollen shedding was greatest on cold windy days and with the other species on warm days. Pollen counts were generally much larger to leeward than to windward of source trees but pollen travelled as far on relatively calm as on windy days, possibly slightly farther. The relationship between pollen dispersal and race formation is discussed. In Douglas Fir, Cedar, Ash, Pinyon Pine and Spruce, pollen dispersal is sufficiently limited to permit genetic differentiation, especially in regions where population is low.

3689. **[Pollination of *Araucaria cunninghamii*.]** *Rep. Dir. For. Qd. 1950/51*, [1951] (7).

Observations were made in Queensland for the first time on the mechanism of pollination in Hoop Pine, and attempts at controlled pollination were begun. It was observed that the ♀ cone appears at about Christmas time and is receptive for about one month, during which time pollen flies on the same tree. The only provision against selfing in nature appears to lie in the fact that the ♂ amenta are, in general, situated below the ♀ cones on the tree. Controlled pollinations, including selfing, were successful. Selfed cones on two trees gave laboratory germination of up to 60% compared with 40% maximum for open pollinated seed in the same crop. This high % of viable seed differs greatly from the behaviour of *Pinus taeda* and *P. caribaea* where selfing is associated with very poor viability.

3690. BREVIGLIERI, N. Ricerche sulla biologia fiorale e di fruttificazione della *Castanea sativa* e *Castanea crenata* nel territorio di Vallombrosa. **[Studies of the biology of flower and fruit of *C. sativa* and *C. crenata* in the Vallombrosa district.]** *Pubbl. Cent. Stud. Castagno, Firenze* No. 1, 1951 (15–49 + 32 photos). 51 refs. [It.it.f.e.g.]

Gives the results of studies made between 1946 and 1950 in the experimental arboretum of the forest of Vallombrosa, particularly on phenological phases (foliation, anthesis, characteristics of inflorescences, development of the cupule) and fertilization (characteristics of pollen, wind and insect pollination). Data are also given on incompatibility, cross fertilization, carpoxenia, and apomixis.

3691. INAL, S. Türkiyede palamut meşesinin (*Qu. aegilops* L.) meyve olgunluğu üzerinde bir müşahede ve tesbit. **[Observations and conclusions on the fruiting of *Quercus aegilops* in Turkey.]** *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (2), 1951 (97–110 + 6 photos). 18 refs. [Turk.G.]

Discusses the systematic position of *Q. aegilops* and its varieties, and their distribution in Turkey, and concludes from observations that the ability to ripen fruit in 1 or in 2 years is not confined to any particular form of the species or to any definite region in Turkey.

3692. NÁVRAT, C. Studium kvantity a kvality semen v modřínových šiškách různých ročníků. **[Investigation on the quantity and quality of seeds in Larch cones of different ages.]** *Lesn. Práce* 30 (1), 1951 (21–6). [Cz.cz.]

Ice-covered cones of 1948, 1947, and 1946 were found on Larch branches broken off 80- to 100-year-old trees by frost in December, 1948. Neglecting some cones attacked by *Megastigmus seitneri*, a detailed analysis was made of 25 cones of 1948, 58 of 1947, and 22 of 1946. It was found that: (1) the heaviest seeds were present in the middle, and the lightest seeds in the upper part of cones of each year class; (2) natural shedding, on a weight basis, was 96·06% of all seeds during the first year and 0·93% during the second; (3) on a number basis, the figures of natural shedding were: 91·88% during the first year, and 1·69% in the second; (4) the seeds from the middle part of the cone are shed most easily and have always the greatest germination capacity (ca. 52% in the new cones), while that of 2nd- and 3rd-year seeds averages ca. 3%. The latter figure, together with the small number of seeds left, seems to indicate that the best seeds are shed, in nature, in the first year.

3693. LITTLE, E. L., and DORMAN, K. W. **Geographic differences in cone-opening in Sand Pine.** *J. For.* 50 (3), 1952 (204–5). 6 refs.

Pinus clausa found in western Florida have cones that open naturally, and experiments are being made to determine whether these trees represent a genetically different race from those of eastern Florida, whose cones open only on exposure to fire. [Cf. *For. Abstr.* 13 (No. 2838).]

3694. **Natural regeneration [: seed fall studies].** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1950*, 1951 (33).

Abies seed that fell on deep snow germinated on the snow banks in the spring; none of these seedlings survived. Hemlock, Cedar and Douglas Fir seeds that fell on the snow did not germinate until after it had melted.

3695. LARUE, C. D., and MUZIK, T. J. **Mangrove vivipary.** *Rep. fed. Exp. Sta. Puerto Rico* 1951 (13).

An attempt was made to determine whether the viviparous embryos of *Rhizophora mangle* will form roots before they are fully mature and fall off. Embryos not above ½ full size will root prematurely if planted in sand. Those planted in sand and irrigated with fresh water developed 20 times as many roots as the same number irrigated with salt water. A relatively small number (± 4%) of embryos fail to fall perpendicularly from the tree and to stick in the mud; although these may bend their stems and come to grow erect, their chances of survival are less than those stuck upright. [Cf. *For. Abstr.* 13 (No. 2842).]

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 3557, 3616, 3625, 3706, 3727–8, 3746, 3803–5, 4092, 4097–8, 4173, 4364–5.

3696. SMITH, C. M. **Further notes on *Metasequoia glyptostroboides*.** *N.Z. J. For.* 6 (3) 1951 (257–8 + 3 photos). 4 refs.

Notes on branching habits, buds, and leader habit, observed on a plant grown out of doors at Wellington. The growth habit is sympodial—a feature that is frequent in hardwoods (e.g. *Fagus*) but unusual in conifers. [Cf. *For. Abstr.* 11 (No. 882).]

3697. LARSEN, N. A. Endnu et bidrag til belysning af teorien om negative grene. **[A further contribution to discussion on the theory of 'negative' branches.]** *Dansk Skovforen. Tidsskr.* 36 (2), 1951 (61–70). 11 refs. [Dan.]

Outlines previous discussion on the theory [cf. *For. Abstr.* 13 (No. 158)]. In an experiment, 37 branches were selected in a 61-year-old Beech wood; of these, 22 showed a distinct furrow under the branch and were classed as 'negative', while 15 showed a swelling and were classed as 'positive'. On 26 March 1949 a ring of bark 1 cm. broad was removed from the branches as close to the stem as the branch angle allowed; the exposed wood was covered with grafting wax which was later removed from all except 5 'negative' and 5 'positive' branches, because sap was clearly flowing between the wax and the wood. By 17 August 1949, callus had formed on all but one of the wounds, from the stem side and more strongly from the side towards the branch tip. This shows that a strong sap-stream was passing downwards from the branch tip and that none of the branches was living at the expense of the tree as a whole. Date of flushing in the spring and presence or absence of autumn colouring did not appear to be related to the 'negative' or 'positive' classification of the branches.

3698. ULLRICH, H. Über die Prinzipien pflanzlicher Festigkeitsverhältnisse, insbesondere bei Holzpflanzen. **[The principles of plant stability, particularly in woody plants.]** *Ber. dtsch. bot. Ges.* 64 (9), 1951 (275–83). [G.] O.B.D.

Discusses the way in which the woody tissues of plants are laid down so as to maintain the stability of the tree, i.e. to correct deformations and uphold the balance of the tree, particularly as new branches are formed. [Cf. *For. Abstr.* 13 (No. 4173).]

3699. LASSCHUIT, J. A. **Alterations in spirally curved trees of *Pinus merkusii*.** *Tectona* 41 (3/4), 1951 (1952), (179–88). [E.jav.]

Details the methods of an investigation, interrupted by the war, of the way in which the stems of *P. merkusii*, which often twist spirally in youth, straighten out as the tree grows older. The spiral is always left-handed (counter-clockwise), its axis being as a rule perpendicular.

So far as observed, spiral form is most pronounced on better sites (with fast growth) and in crowded or shaded conditions. Its relation to spiral grain (also left-handed in younger wood but right-handed in older) is not known. It is, however, an unfavourable factor in resin tapping and for timber and pulpwood production. Results of observations during the first 27 months are presented.

181.8. Phenology

See also Nos. 3562, 3685, 3690.

3700. BERGER-LANDEFELDT, U., and BUSCH, D. Phaenometrische Beobachtungen 1951. **[Phenological observations and measurements made in 1951.]** *Ber. dtsch. bot. Ges.* 64 (6), 1951 (150–5). 5 refs. [G.] O.B.D.

Measurements of the development of leaves of Birch, Beech, Lime and Lilac during the growth season of 1951 were related to temperature. Results are presented graphically and discussed.

3701. FRASER, D. A. **Initiation of cambial activity in some forest trees in Ontario.** *Ecology* 33 (2), 1952 (259–73). 29 refs. [Forest Insect Laboratory, Sault Ste. Marie.]

In this study (mainly of White Pine), two methods were used: sectioning of samples of bark and outer wood, and daily measurement of radial increment with a dendrometer. Although the latter method gives a more continuous set of measurements, the sections help in the interpretation of the results.

The initiation of cambial activity was found to proceed from apex to base, as in Europe, and the suggestion that American trees might behave differently because of the cold winters was not substantiated. The results confirm Jost's theory of a stimulus, not associated with food, proceeding from the buds and developing leaves in spring, and responsible for the apical initiation of cambial activity. This stimulus is probably produced by a growth hormone which former workers have shown to be present. The application of heteroauxin in the proper concentration stimulates cambial activity and the continued production of spring wood. With a greater concentration, 'redwood' or compression wood is produced. [Cf. *For. Abstr.* 13 (No. 2852).] *From author's summary.*

182. *Synecology, Plant Sociology: General, Principles and Methods*

182.1. Palaeoecology. History of Vegetation

See also No. 3670.

3702. FIRBAS, F. Spät- und nacheiszeitliche Waldgeschichte Mitteleuropas nördlich der Alpen. Zweiter Band: Waldgeschichte der einzelnen Landschaften. **[The late-glacial and post-glacial forest history of central Europe north of the Alps. Vol. II: Forest history of the individual regions.]** Gustav Fischer, Jena. 1952. pp. 256. 14 pp. of refs. [G.]

Contains as an appendix a list of addenda and corrigenda to Vol. I. [See *For. Abstr.* 12 (No. 24).]

182.2. Succession, Alternation, and Periodicity in Vegetation

See also Nos. 3670, 3715, 3812, 4459.

3703. KASSAS, M. **Studies in the ecology of Chippenham Fen. III. The forty acre wood. IV. Tree and bush colonization in South Chippenham Fen.** *J. Ecol.* 40 (1), 1952 (50–73 + 8 photos). 2 refs.

Cf. *For. Abstr.* 12 (No. 2764); 13 (No. 164).

3704. JURKO, A. Príspevok k výskumu jedlín v okolí Gelnice. **[Investigation of Silver Fir stands in the neighbourhood of Gelnica.]** *Lesn. Práce* 30 (2), 1951 (103–6). 4 refs. [Slovak.]

The mining of iron and copper ores in Central Slovakia for the last 700 years, and particularly for

the last 300, is responsible for the gradual recession and extermination of the native Beech, which was used both for mining and smelting. Natural regeneration was rendered impossible by clear felling and the removal of Beech litter. Spruce and Fir have replaced Beech, which now forms enclaves in mixture with Maple, Ash, Fir, and Birch.

3705. Zozulin, G. M., and Kusmarceva, N. M. Izmenenie granic drevesnokustarnikovoĭ i travjanistoĭ rastiteljnosti na opytnyh učastkah Centraljno-černozemnogo zapovednika za 5 let. [Change of the boundary between woody vegetation and grassland on experimental plots in the Central Chernozem Reserve after 5 years.] *Bot. Ž.* 36 (3), 1951 (240–8). 3 refs. [Russ.] I.M.I.

Reports on observations made in 1945 and 1950 on 4 experimental plots in this reserve, which lies in the central forest-steppe 18 km. south of Kursk and [illegible] of woodland (chiefly Oak and Ash) and [illegible] and scrub thicket, with grassland in between. [illegible] and all aspects and gradients, woody [illegible] found to be colonizing the grassland [illegible] having advanced 1–8 m. in the [illegible] *Prunus spinosa, P. fruticosa, Amygdalus* [illegible] *nemula* (in moister glades) as the [illegible] Oak comes in very slowly [illegible] later when grass mowing [illegible] growing also [illegible] [illegible] [illegible]

Pico—the Azores. *J. Ecol.* 40 (1), 1952 (143–55). 6 refs.

3712. REGINSTER, P. La cartographie des associations végétales forestières du Plateau des Tailles dans leurs rapports avec la sylviculture. [**Mapping of the forest plant associations of the Tailles plateau in relation to silviculture.**] *Comptes rendus de Recherches, Travaux du Comité pour l'Établissement de la Carte des Sols et de la Végétation de la Belgique, Brussels* No. 4, 1950 (251–6). [F.] H.S.B.

A preliminary report describing plant associations and soil types.

3713. BOYKO, H. **On the climax vegetation of the Negev, with special reference to arid pasture problems.** *Palest. J. Bot.* (*R. Ser.*) 7 (1/2), 1949 (17–35 + 2 plates). 9 refs. E.M.B.

3714. EMBERGER, L. Observations phytosociologiques dans la forêt dense équatoriale. [**Ecological observations in dense tropical forest [in the Ivory Coast].**] *Repr.* from *Archives de l'Institut Grand-Ducal de Luxembourg* (*n.s.*) 19, 1950 (119–23). [F.]

Cf. *For. Abstr.* 13 (Nos. 172–3).

3715. LÉONARD, J. Aperçu préliminaire des groupements végétaux pionniers dans la région de Yangambi (Congo Belge). [**Preliminary survey of pioneer vegetation types in the Yangambi region (Belgian Congo).**] *Vegetatio* 3 (4/5), 1950 (1952), (279–97). 13 refs. [F.] A.P.B.

3716. GILLILAND, H. B. **The vegetation of eastern British Somaliland.** *J. Ecol.* 40 (1), 1952 (91–124 + 5 photos). 24 refs.

The vegetation is described and related, as far as possible, to the descriptions of Gillett (1941), Collenette (1931) and Edwards (1942). Three formations in Clements' sense are recognized: two deciduous types and one evergreen. The principal genera of the deciduous types are *Acacia, Grewia, Commiphora, Suaeda* and *Sporobolus*; of the evergreen type—*Juniperus, Sideroxylon, Buxus, Dodonea, Themeda, Pennisetum, Digitaria* and *Cynodon*. A 'gypsum-tolerant' vegetation, in which many species of Capparidaceae are prominent, together with *Suaeda* and its allies and *Salvadora persica*, is described.

The communities resulting from the grazing coaction of domesticated stock (principally camel, sheep and goat) are noted. Deterioration of the vegetation from this cause is taking place, evidenced, particularly in the mixed deciduous formation, by grave wind erosion.

The climate, coupled with the present topography, suggests that desert conditions did not always obtain in their present severity. This conclusion is reinforced by the results of a collection of stone implements made at the same time. The concept of a post-climax could therefore be used in interpreting the vegetation, and proved valuable in dealing with certain communities, which appeared to be omnipresent.

In the evergreen montane vegetation certain genera were encountered which are normally regarded as 'temperate' genera, e.g. *Juniperus, Buxus, Lavandula, Viola, Rosa, Poa, Ehrharta* and *Bromus*. *From author's summary.*

3717. EGLER, F. E. **Southeast Saline Everglades vegetation, Florida, and its management.** *Vegetatio* 3 (4/5), 1950 (1952), (213–65 + 4 plates). 41 refs. A.P.B.

Presents a detailed study of the vegetation of this region and the influence of fire and agricultural practices on its development. Particular reference is made to the introduction and naturalization of *Casuarina equisetifolia* and to the Mangrove forests.

3718. MCMINN, R. G. **The role of soil drought in the distribution of vegetation in the Northern Rocky Mountains.** *Ecology* 33 (1), 1952 (1–15). 7 refs.

An investigation was carried out during the summer of 1950 on 7 plant associations of grassland, shrub, and forest, to determine differences in soil moisture and temperature among the associations. It was found that, with two exceptions, there was a series, with the grassland soils the warmest and each succeeding association up the slope having a progressively cooler soil in summer. The exhaustion of growth water, from the surface to a depth of 1 m. or more, by the end of August, occurred earliest in the grass/shrub association, later in the shrub, and last or not at all in the forest. Variations from these typical results were due to differences in exposure, topography, and present condition of the plant cover. The results are held to show that in the Northern Rocky Mountains, where precipitation is mostly in the winter, and summer drought is normal, different plant associations are correlated with different extents of soil drought. [Cf. *For. Abstr.* 13 (No. 3564).] *From author's summary.*

3719. RAWITSCHER, F. O problema das savanas brasileiras e das savanas em geral. [**The problem of the Brazilian savannas and of savannas in general.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (32–8). 33 refs. [Port.port.e.]

Discusses the causes of loss of fertility in savanna lands, with particular reference to the 'campos cerrados' of Emas, Pirassununga, and suggests that the best method for conserving fertility in tropical regions is to grow crops under shade trees, using, if possible, suitable species already existing in the forests. [Cf. *For. Abstr.* 11 (No. 142).]

3720. ROSEVEAR, D. R., and LANCASTER, P. C. **A review of silvicultural experiment and practice in Nigeria.** Forest Department, Nigeria. 1952. pp. 14. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The history of silviculture in Nigeria is briefly traced, showing that the emphasis, despite series of experiments, was upon artificial regeneration until 1943, since when those rich and heavily exploited Mahogany forests which supply the export trade have been regenerated on a large scale by natural means. The method employed, named the tropical shelterwood system, is described, together with some of the practical problems it presents, and possible modifications of the technique to meet these. A brief review of plantation practice is given both for short-term firewood schemes of exotics and for long-rotation taungya plantations of local species; and, finally, a short note on the unsatisfactory position of silviculture in the vast savanna zones is added. *Authors' summary.*

3721. STOATE, T. N. **Silvicultural research in Australia.** *Aust. J. Sci.* 14 (3), 1951 (80–2). O.B.D.

A general discussion of the lines of research being followed in Australia at present.

3722. **[Current research on] silviculture.** *Special Supplement* to *For. Chron.* March, 1952 (29–48).

Summary accounts of current research by the Dominion Forestry Branch, provincial Forest Services, and other organizations.

3723. **American sylviculture and tropical forest problems.** *OEEC Documentation, Paris* 1952. pp. 95.

Part II of the report of the OEEC Technical Assistance Mission (No. 18A) to the subtropical forest areas of the U.S.A. It contains the following chapters: Improvement of pastures in relation to erosion control. Reforestation with conifers. Ecology and silviculture of Pines in North Florida. Control of erosion. Water consumption of vegetation and general watershed hydrological research. [Cf. *For. Abstr.* 13 (No. 3868).]

3724. FORS Y REYES, A. J. Manual de selvicultura. **[Textbook of silviculture.]** Ministerio de Agricultura, Havana. 1947. pp. 323 + 1 tbl. 30 refs. [Span.]

A reference book dealing with forest ecology, silvicultural systems, nursery practice, planting methods, care of plantations, forest protection, and the silviculture of certain species of importance to Cuba.

3725. WILLIAMS, R. W. M., and CHAVASSE, C. G. R. **The silviculture of Silver Beech in Southland.** *N.Z. J. For.* 6 (3), 1951 (219–35 + 3 photos). 3 refs.

The silviculture of Silver Beech [*Nothofagus menziesii*] in Western Southland is outlined. The virgin forests of the optimum management areas are described and inferences drawn for their successful conversion by natural regeneration to fully managed even-aged crops. The expected regeneration period is 10 years, seed years occurring every 3–6 years. Data on growth rates from sample plots and stem analyses are presented, indicating slow initial growth and a rotation of maximum volume production of about 135 years. Notes are given on the present silvicultural technique employed. *From authors' summary.*

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See Nos. 3869, 4122.

222. *Coppice, Pollarding and Lopping Systems*

See Nos. 3726, 3736.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

3726. GILLEN, E. Das Problem des Eichenschälwaldes im Grossherzogtum Luxemburg. **[The problem of Oak tanbark coppice in the Grand Duchy of Luxembourg.]** *Schweiz. Z. Forstw.* 103 (3), 1952 (97–102). [G.f.]

Describes the methods being employed to convert Oak coppice, no longer wanted for the production of tanbark, to mixed conifer/hardwood forest.

228. *Constitution and Composition of Stands; Forms of Stand. Tree Classes*

See also Nos. 3820–3, 3831–2, 4123, 4129

3727. WELLNER, C. A., and EVENDEN, J. C. **A vigor classification for mature Western White Pine as an aid to timber markers.** *Rep. Nth. Rocky Mt. For. Range Exp. Sta. 1951,* [1952] (8–9).

A classification (shown in tabular form) has been developed for predicting the ability of mature trees to grow and resist destruction by damaging agents. It has 4 classes, from poor to excellent, and is based on crown class, crown density, live crown length in % of tree height, crown width, crown colour, tip vigour, and frequency of dead branches in the upper crown.

3728. WELLNER, C. A. **A vigor classification for mature Western White Pine trees in the Inland Empire.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 110, 1952. pp. 2 + 1 tbl.

Cf. preceding abstract.

3729. KABZEMS, A. **Stand dynamics and development in the mixed forest.** *For. Chron.* 28 (1), 1952 (7–22).

Discusses changes in stand structure and composition in mixed (White Spruce/Black Spruce/hardwoods) forest, apparently in Saskatchewan.

3730. SUSMEL, L. **Trattamento delle abetine disetanee. [The management of uneven-aged stands of Silver Fir and Spruce in the Belluno alps.]** *Monti e Boschi* 3 (4), 1952 (147–56). [It.f.e.]

Cf. *For. Abstr.* 13 (No. 1088).

23. REGENERATION AND FORMATION OF STANDS

231. *Natural Regeneration*

See also Nos. 3683–5, 3694–5, 3824, 4068–9.

3731. WALKER, F. S. **Mangrove silviculture.** *Malay. Forester* 15 (1), 1952 (50–2).

Comments on an article in the previous issue [cf. *For. Abstr.* 13 (No. 2013)], and argues against the practices of cutting to a diameter limit or leaving a reserve stand.

3732. HOWE, S. C. **Black Spruce regeneration in Manitoba.** *Annual Ring* No. 5, 1952 (32–3).

3733. GORDON, D. T., and COSENS, R. D. **Slash disposal and site preparation in converting old-growth Sugar Pine/Fir forests to regulated stands.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 81, 1952. pp. 7. 5 refs.

The methods used in mixed stands of *Pinus lambertiana*, *Abies concolor* and *A. magnifica* in an attempt to encourage regeneration of *P. lambertiana* and to improve its position in the stand are described. Costs of labour and equipment for 1948 and 1949 are tabulated.

3734. STOECKELER, J. H. **Disking to regenerate pulpwood species.** *Tech. Note Lake St. For. Exp. Sta.* No. 372, 1952. pp. 1.

After disking of strips in a thin, patchy stand of Balsam Fir and mixed hardwoods in 1950, 307,900 seedlings per acre were observed in 1951 on disked strips, and hardly any on undisked strips. Figures showing quadrats stocked and seedlings per acre by species are tabulated.

3735. JONES, E. W. **Natural regeneration of Beech abroad and in England.** *Quart. J. For.* 46 (2), 1952 (75–82 + 5 photos).

The contrast between the ease with which regeneration of Beech is obtained in some forests on the continent and the difficulties experienced by foresters in England is largely due to the infrequency of mast years and the plentifulness of blackberry bushes, in England. Continental methods are examined and discussed, with a view to solving some of the problems, particularly in the Chilterns, where the regeneration of Beech is at present the subject of a detailed investigation by the Forestry Commission.

3736. DUDA, E. J., and NASH, R. W. **Birch studies.** [*Biennn.*] *Rep. Me. For. Comm. 1949–50*, 1951 (94–7).

Studies of cutting tests and of areas felled in the past do not give much hope of extensive coppice reproduction of White and Yellow Birch from stumps of merchantable trees. Sprouts start, but after 1–3 years are all dead. Severe deer and rabbit browsing is apparently responsible, since on stumps surrounded by slash, sprouts grew well. Young, thrifty trees cut in the spring coppice best.

232. *Artificial Regeneration*

3737. HOLTEN, J. **Kulturmåder i Danmarks gamle skovegne 1950. [Methods of stand establishment on old woodland sites in Denmark.]** *Forstl. Forsøgsv. Danm.* 20 (2), 1952 (111–64). [Dan.e.]

Various horse- and tractor-drawn cultivators and planting machines used in Denmark are described and illustrated. Where tractors are used in regeneration areas, closely spaced standards hinder their passage and the roots may be damaged by their weight; the possibility of clear felling and replacing the standards with quick-growing light-demanding nurses such as Alder, Birch and Larch is discussed. Experiments have been made with wider distances between rows when establishing new stands; for Oak, doubling the normal distance of 1·25 m. seems to give good results, the rows sometimes being interplanted with Spruce or Larch. Planting distances for conifers depend mainly on the demand for small sizes. Cheaper Beech plants are sometimes produced by cultivating the soil of an old stand thoroughly before a mast year and lifting the seedlings obtained.

3738. **Establishment practice.** *Special Supplement* to *For. Chron.* March, 1952 (19–29).

Summarizes current practice in direct sowing and planting in (*a*) British Columbia, (*b*) Ontario, (*c*) Quebec, (*d*) New Brunswick, and (*e*) Nova Scotia.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 3563, 3808 *et seq.*

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 3717, 4007, 4461.

3739. FRANCO, J. M. A. P. DO AMARAL. De l'expansion culturale du cyprès de Buçaco en Portugal. **[Expanding the cultivation of *Cupressus lusitanica* in Portugal.]** *Repr.* from *Compte Rendu du 16e Congrès International de Géographie, Lisbonne 1949*, 1950 (775–80). 8 refs. [F.]

Discusses its introduction into Portugal and its silvicultural requirements. It appears to thrive in climates where *Quercus robur* subsp. *broteroana* O. Schw. and *Q. pyrenaica* are dominant.

3740. GECOW, R. Żywotnik olbrzymi. [***Thuja plicata.***] *Sylwan* 96 (1), 1952 (52–69). [Pol.e.]

A plot of 475 sq. m. in the Wirty state forest (Pomorze, Poland) was planted in 1890 with 3-year-old *T. plicata*. The climate resembles that of the species' native habitat in N. America. In 1947, there were 57 trees totalling 3·299 sq. m. basal area, with an average d.b.h. of 27·1 cm., average height 24·0 m., average tree volume 0·6496 cu.m., and stand volume 37·03 cu.m., representing a m.a.i. of 0·617 cu.m. Including 41 trees felled in previous years (7·60 cu.m.), the total yield was 44·63 cu.m., or nearly twice that for Pine of the same age and site quality. *Armillaria mellea* and *Polyporus schweinitzii* were found to have caused butt rot in several stems, and an attack by *Trametes pini* is suspected. The trees withstood very well the exceptionally severe frosts of 1928–9.

3741. MEADE, F. M. **Forest plantations in Arkansas.** *Bull. Ark. agric. Exp. Sta.* No. 512, 1951. pp. 50.

A survey was made of 70 plantations throughout the Arkansas Ozarks. One of the outstanding

features noticed was the success of the native Pine, *P. echinata*, and the fairly consistent failure of most hardwoods. *Robinia pseudoacacia* was successful on good sites with high fertility and adequate moisture, but failed on sites with poor fertility and moisture. *P. echinata* appeared to be the best tree for planting in the Ozarks; *P. taeda*, which outgrows it in youth, is damaged by ice storms, as are *P. caribaea* and *P. palustris*, which grow well. The trees in two plantations of *P. ponderosa* died at an early age; a plantation of *P. strobus* grew well but the trees were unthrifty in appearance. Planting in mixtures did not appear desirable. Spacing of *P. taeda* at distances of less than 6 × 6 ft. is not thought advisable. [Cf. *For. Abstr.* 13 (No. 3804).]

3742. Pourtet, J., and Turpin, P. L'*Eucalyptus* en France: premiers résultats expérimentaux et possibilités d'avenir. **[Eucalypts in France: first experimental results and future possibilities.]** *Rev. for. franç.* 1952 (3), (210–4). [F.]

[Cf. *For. Abstr.* 12 (No. 1883).] Includes notes on nursery practice.

3743. Chinte, F. O. **Trial planting of Large Leaf Mahogany (*Swietenia macrophylla* King) [in the Philippines].** *Philipp. J. For.* 6 (4), 1952 (313–27 + 5 photos). 33 refs.

232.12. *Races and Provenance Trials*

3744. Oksbjerg, E. Nyere bidrag til rødgranens proveniens- og forædlingslære. **[Recent contributions to the study of provenance and breeding of Norway Spruce.]** *Dansk Skovforen. Tidsskr.* 36 (3), 1951 (119–44). 22 refs. [Dan.]

A review of research in Scandinavia, Germany and Switzerland.

3745. Schulenberg, A. F. v. d. Proveniensforskningen visar vägar för avsevärd främjade produktion hos massavedsträden i Nordeuropas skogar. **[Provenance research shows how to obtain greater yields from pulpwood trees in the forests of northern Europe.]** *Dansk Skovforen. Tidsskr.* 36 (8), 1951 (437–49). [Sw.]

Discusses the importance of finding Spruce of suitable provenance to give good yields in spite of frost danger, and urges the use of *Pinus contorta* var. *latifolia*, preferably mixed with hardwoods, for good forest soils, partly because of its excellent yield of pulpwood on these sites and partly because of its good effect on the soil.

3746. Børset, O. Forsøk med avkom av enkelttrær fra kystfuruskogen på Hvaler. **[Research on progenies of individual trees from the coastal Pine forest at Hvaler [S. Norway].]** *Medd. norske Skogforsøksv.* 11 (1) (No. 38), 1951 (129–58). 4 refs. [Nor.e.]

Investigations were made on progenies from 6 Pines, ranging from a bush form 1 m. high growing 8 m. from the shore, to a tree form 16·8 m. high, and 185 m. from the shore. Investigations of cone length, 1000-seed weight, height of 1-year plants, and germination %, showed that the only significant correlation was that between tree height and cone length ($r = -0{\cdot}87$). The seeds were collected in 1935, and the plants were planted out in 1938 and measured in 1942 and again in 1948, when the plots were thinned by felling alternate trees, and diameter and height measurements made. The following results were obtained: (1) Cone length varied between 3·2 and 4·2 cm., the smaller trees having the longest cones. (2) Germination was high, bush forms (up to 2·8 m. high) giving a germination of 93–96%. (3) No correlation was found between seed weight and height of 1 + 0 seedlings. (4) No significant height differences were found between the progenies, but differences in the occurrence of forked stems were significant. (5) In 1948, significant differences in diameter and in terminal-shoot length were found, proving genetic differences between the progenies. (6) Grouping the material by the height of the mother tree into bush and tree forms showed that the progenies of the 3 bush-form trees were superior to those of the 3 normal trees. The material is not, however, sufficiently large to prove any general difference between bush and tree forms. It is concluded that, in Hvaler, seed collection can be made equally well from the small bushy Pines along the sea shore and the larger, well shaped trees further inland.

3747. Løfting, E. C. L. Danmarks skovfyrproblem. **[The problem of Scots Pine in Denmark.]** *Forstl. Forsøgsv. Danm.* 20 (1), 1951 (1–109). 73 refs. [Dan.e.]

Discusses the distribution of Scots Pine in Europe, surveys the provenance of seed used in Denmark in the past, summarizes relevant provenance research in other countries, gives a historical review of the cultivation of Scots Pine in Denmark, and presents the results of recent provenance trials on Danish dunes and inland heaths. Results were variable within a given provenance and area. Finnish Pine did well on some inland areas, and badly on others. West Norwegian Pine was rather slow-growing but of good form in all areas. Some trees of Swedish Pine from Småland and of Baltic Pine from Riga did well on heaths, while others failed. Pine from Scotland throve on the heaths. Pine from Belgium did badly in all areas. Skramsø Pine did badly in central Jutland but throve, although its shape was poor, on the dunes. Measurements of soil and air temperature and of rainfall on the dunes and on the podzol heaths are discussed in relation to provenance, and recommendations are made on this basis for trials of some new provenances. For conditions favourable to the species, provenances should be selected from optimum regions, but for unfavourable sites provenances should be chosen from regions where the species is adapted to limiting conditions (especially of air and soil temperature) similar to those of the new site.

3748. Minckler, L. S. **Loblolly Pine seed source and hybrid tests in southern Illinois.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 128, 1952. pp. 8.

Gives 3rd-year results of tests of Pine hybrids and of Loblolly Pine from different sources. Results, which are tabulated, show that for the three criteria —survival, height growth, and appearance, seed from Maryland and Virginia was superior, from Arkansas satisfactory, and from N. and S. Carolina and Mississippi sources inferior, on upland old

fields of S. Illinois. In the hybrid tests, seedlings of two Loblolly and Shortleaf hybrids were compared with Loblolly Pines from a Tennessee source. Hybrid 2 ($\frac{3}{4}$ Loblolly, $\frac{1}{4}$ Shortleaf) was superior to hybrid 1 ($\frac{1}{2}$ Loblolly, $\frac{1}{2}$ Shortleaf), while the Tennessee Loblolly showed better height growth than either. Both hybrid 2 and the Tennessee Loblolly made better height growth than the best source (Maryland) in the other trials. Neither hybrid nor the Tennessee Loblolly was damaged by frost.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See also Nos. 3613 *et seq.*, 3744, 3748.

3749. JOHNSSON, H. Hybridaspen och dess odling. [***Populus tremula* × *tremuloides* and its cultivation.**] *Skogen* 39 (3/3*), 1952 (68–70). [Sw.]

Gives figures showing its height growth, and discusses soil requirements, planting distances, growth when planted in mixed stands with Spruce, and regeneration from root suckers.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 3737, 3812–3, 3816, 3959.

3750. RENNIE, P. J. **Physico-chemical properties of forest soils.** *Rep. imp. For. Inst. Oxf. 1950/51*, 1952 (10).

Studies of particle-size distribution in a range of soils from Allerston Forest have shown that an increase in the smaller sized particles is usually correlated with increased difficulty of afforestation on these soils. The success of cultivation also appears to be related to particle size. On Silpho Moor, deep, as compared with shallow ploughing ensures greater survival and marked improvement of growth. Shallow ploughing results in high mortality where the soil has a high clay content, whereas deep ploughing ensures satisfactory survival and markedly improved growth. Deep ploughing hardly alters the porosity under the ridges, so that on normal ploughing (4 ft. 6 in. between ridges) some 38% of the land is left with its original poor aeration. The aeration of the inverted and undisturbed peat horizons, however, is greatly increased, and on the lighter soils this can result in much improved humus conditions. The effect of trees on porosity has been the subject of a number of comparative tests. It is noteworthy that even with shallow ploughing, aeration under 20-year-old Sitka Spruce is improved to a depth of 60 cm.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

232.311. Seed Production (Seed Years, Seed Crops etc.)

See also Nos. 3617, 4029–30, 4433.

3751. RUMMUKAINEN, U. Kuusen siementuhoista vuonna 1951. **[Damage to Norway Spruce seed in 1951.]** *Metsät. Aikak.* 1952 (2), (44–6). [Fi.]

Gives figures showing the extent of insect damage to seed in 1951, a good seed year, as related to the abundance of the cone crop in the various districts. The % of damaged seed was lowest in districts where the crop was largest, and highest in those where it was poorest.

3752. MAKI, T. E. **Local Longleaf seed years.** *J. For.* 50 (4), 1952 (321–2).

Preliminary data from a test on 8 second-growth trees of *Pinus palustris* in Mississippi for the years 1946–51 are tabulated. The first and last years gave heavy crops of seed; the others were medium or light.

3753. **[Production of seed by *Pinus radiata* in the Australian Capital Territory.]** *Rep. For. Timb. Bur. Aust. 1950* [1951] (17).

Some trees produce little or no seed in years of high general seed production, and the same trees may produce heavily in years of low general production. Average cone and seed sizes vary from year to year.

3754. HERMANN, S. Im Primärstadium blühende Kiefer. [***Pinus mugo* flowering in its primary stage.**] *Naturwissenschaften* 38 (16), 1951 (381–2). [G.] [Forstbotanisches Institut der Universität Göttingen.] O.R.S.

P. mugo grafted on to a *Picea abies* seedling of the same age produced ♂ flowers at 16 months while the primary leaves were still present and before the paired needles appeared.

232.312. Seed Collection, Extraction and Grading

See also Nos. 3666, 3746.

3755. TŮMA, A. Stroje a nářadí ke sběru a zpracování lesních semen. **[Machines and tools for harvesting and treating forest seeds.]** *Csl. Les.* 31 (14/15), 1951 (309–13). [Cz.]

An illustrated description of machines and tools designed and made in the USSR. They include: combs, knives, hooks, small saws, portable ladders, machines for de-winging, screens (sieves), mills for cleaning and grading etc.

3756. KASALICKÝ, E. Za zvýšeni kvality semena jehličnanů. **[Improving the quality of coniferous seeds.]** *Lesn. Práce* 31 (1), 1952 (9–13). [Cz.]

Low germination values for coniferous seed are often due to premature collection. Best results are obtained when both the seeds and the cones are relatively dry. If cones have to be harvested before they have matured on the tree, they should be properly stored, so as to dry off before seed extraction. The effects of weather on the ripening of cones and seeds on trees is briefly referred to, and extraction conditions are discussed on the basis of work by Tyszkiewicz [cf. *For. Abstr.* 11 (No. 1768)], who recommends that irrespective of the extraction temperature—which should not, however, exceed 50° C.—the absolute humidity should not rise above 40 mm. Hg. Two cases are cited of low viability (in *Pinus sylvestris* and *P. strobus*) caused by premature harvesting.

3757. STEFANSSON, E. Klängningsförsök med ofullständigt mogen tallkott. **[Extraction experiments with Scots Pine cones that were not fully ripe.]** *Skogen* 38 (5*), 1951 (56*–57*). [Sw.]

Cones were collected in early September from three districts; some were extracted immediately, and the rest on 15 October and 15 December 1949 and on 15 February and 15 December 1950. Results of germination tests are tabulated and show that for all districts viability was lowest in September, increasing from 5 to 46%, from 50 to 69% and from 14 to 77% respectively for seed extracted on 15 October 1949. Seed extracted on 15 December 1949 showed a slight decrease in viability in two cases and a slight increase in the third. Viability was in all cases lowest when seed was stored for 14–16 months after extraction. Seed collected in early September was stored until the beginning of October in paper bags at temperatures a little above freezing point. Part of it was then subjected to a temperature of – 18° C. for 48 hr., then to a plus temperature for 24 hr., and then frozen again. Viability of seed so treated was 72, 59 and 37% respectively compared with 85, 95, and 90% for controls. A graph is given showing the relationship between viability and time taken for extraction.

3758. NORDSTRÖM, L. Tallfrö för Norrlands höjdlägen. **[Scots Pine seed for high altitudes in Norrland.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (3), (354–6). [Sw.]

Half the cones from 10 Pines at 430 m. altitude were collected in autumn, and stored at room temperature; the remainder were collected in winter. Viability of seed from the autumn-collected cones was much the higher. The investigation will be continued.

3759. JAROŠ, P. Některé poznatky a připomínky ke sklizni smrkových šišek. **[Some remarks on the collection of Spruce cones.]** *Lesn. Práce* 31 (1), 1952 (14–7). [Cz.]

Includes a table of yields of sound seed from cones collected in 20 localities in Bohemia, in 1948–9, varying from 1·63 to 4·84 kg. of seed per 100 kg. of cones.

3760. JAROŠ, P. O sklizni a vysévání jilmového semene. **[Harvesting and sowing Elm seed.]** *Čsl. Les* 31 (11), 1951 (247–8). [Cz.]

Fresh (green) seeds of *Ulmus montana* contain over 80% of moisture; completely mature seeds, less than 50%. Plant % is variously stated to be 2½% and 5%. The note gives test results for *U. montana* seed of the 1950 harvest, sown at weekly intervals with a varying moisture content. Best results (germination 22–23%) were obtained with seed shaken from the tree and sown while fresh, then lightly covered with soil, shaded with slats and watered once daily. All seed was sown between established rows of Blue Lupin.

232.315. Seed Storage and Treatment

See also Nos. 3757, 3776, 3784.

3761. HUSS, E. Om grobarhetens förändringar vid lagring av kott och frö. **[Alterations in viability during storage of cones and seed.]** *Skogen* 38 (7), 1951 (151–4). [Sw.]

Results of past and current research are discussed, and shown in graphs and tables. The following conclusions are drawn: (1) Seed with high viability retains its viability better than poorer seed for an equal increase of the seed's moisture content. (2) Seed retains its viability better at 5 than at 22° C. storage temperature. (3) Viability is highest at a moisture quotient of 5–8% of the dry weight and is not appreciably changed by storage for up to 7 months at different temperatures. (4) Above 8% moisture content, the viability is rapidly reduced even with good seed and storage conditions. (5) Seeds reach the critical moisture content in a few hours at 60% relative air humidity. (6) The moisture taken up by a viable seed at a high air humidity reduces its viability in 1–2 months. (7) Seedlings originating from viable seed damaged by storage show poor development.

3762. MORK, E. Faktórer som virker på spireevnen hos furu-, gran- og bjørkefrø. **[Factors influencing the germination of Pine, Spruce and Birch seed.]** *Medd. norske Skogforsøksv.* 11 (1) (No. 38), 1951 (159–73). 6 refs. [Nor.e.]

Seed of *Pinus sylvestris*, *Picea abies*, and *Betula verrucosa* was stored in both open and closed vessels, with and without sand, in the open, from 3 November to 1 March; during the first 6 weeks the weather changed from mild (4° C.) to severe frost (– 10°) several times, and latterly the vessels were covered by snow. During the germination tests the seed was kept at constant temperatures of 10° or 15°. Results are tabulated. Birch seed stored in the autumn, germinated at a lower temperature than normal; the minimum temperature for germination was 10° instead of 20°. There was no loss of viability in the seed stored without sand, but viability decreased in seed that had been covered with sand. Spruce and Pine seeds were killed when covered with sand and stored, and in uncovered seed, viability was reduced by half. It is concluded that autumn sowing of Pine and Spruce will give poor results, but that Birch seed can safely be sown in late autumn. Seed of *B. verrucosa* and *B. pubescens* stored dry at room temperature germinated equally well at all seasons of the year in a thermostat at constant tempefature and light, and retained its viability for 3 years.

3763. FRANSSON, P. Kraftigare tallplantor ur hormonbehandlat frö. **[Stronger Pine plants from 'hormone'-treated seed.]** *Skogen* 38 (2), 1951 (25). [Sw.]

Greenhouse experiments were made by the Swedish Forest Research Institute on the growth of Scots Pine seed after soaking in a solution of methoxone (2-methyl-4-chlorphenoxy-acetic acid). Seedlings from the treated seed developed normally, but a little faster than usual for the first year. During the next stage, however, they developed differently from controls. Whereas the latter began a 6-month rest period, the 'hormone'-treated seedlings continued to grow. A shoot of considerable length, ca. 12 cm. long and 2 mm. thick, was formed within 3 weeks, and lignification was nearly complete within a few more weeks. The root system was also more fully developed than normal.

After they reached this '2-year stage' the seedlings entered the dormant period. Field trials are proposed.

3764. Ramaswami, M. N., and Gowda, D. R. **Pretreatment of seeds with cocoanut water to hasten germination.** *Indian For.* 75 (12), 1949 (1952), (500–1).

Seed of several species was soaked (length of time not stated) in 'water' from tender green coconuts; controls were soaked for the same length of time in tap water. Treatment accelerated germination of *Ocimum kilimanjaricum* and *Cassia siamea* seed, gave increased germination of Balsa seed, and had no apparent effect on germination of *Santalum album* and *Leucaena glauca*. H_2SO_4 treatment followed by soaking in coconut water gave good results with seed of *Adenanthera pavonina*.

3765. Zelinková, M., Hořavka, F., and Řetovský, R. Klíčení jasanu ztepilého (*Fraxinus excelsior*). [**Germination of *F. excelsior*.**] *Sborn. čsl. Akad. zeměd.* 24 (1/2), 1951 (94–101). 19 refs. [Cz.cz.russ.e.] C.G.B.

Describes a method of accelerating germination. The seeds are steeped in water in January or February until well swollen. The embryos are then excised, placed on cottonwool in Petri dishes, and subjected to a temperature of ca. 20° C. under continuous radiation from a 100-watt electric bulb. The embryos become green after several days, when the small seedlings are transplanted into flower-pots and left in the hothouse until the spring. Then they are transplanted into hotbed soil, and finally, in May, into open beds.

232.318. Seed Testing. Germination Tests. Seed Quality

3766. Wieliczka, Z. Seleção das sementes do pinheiro brasileiro. [**Testing seed of Paraná Pine.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (202–7). [Port.e.]

The floating test (using water as the medium) adopted by the Industrias de Celulose Klabin do Paraná, has proved highly successful for seed of *Araucaria angustifolia*, contrary to a report from Germany published in 1941.

3767. Holmsgaard, E., and Kjær, A. Undersøgelse over spiring i laboratorium og planteskole af 4 *Abies*- og 2 *Picea*-arter. [**Research on germination in the laboratory and nursery of 4 *Abies* and 2 *Picea* species.**] *Dansk Skovforen. Tidsskr.* 36 (4), 1951 (203–26). 6 refs. [Dan.]

Results of experiments on *A. alba*, *A. grandis*, *A. nobilis*, *A. nordmanniana*, *P. abies* and *P. sitchensis* were compared to check the value of germination tests made by the State Seed Control. In the nursery tests no very clear distinction was noticed in germination of seeds sown at different times of year, or between untreated seeds and seeds soaked in water or weak acid for 24 hours. The relationship between germination % in the laboratory and plant % in the nursery is shown in graphs. All the species show a clear relationship between germination % and plant %, with a lower plant % for the lower than for the higher germination %.

3768. Zavadil, Z. Praktická methoda stanovení životnosti žaludů biologickou cestou. [**A practical biological method for testing the viability of acorns.**] *Lesn. Práce* 31 (1), 1952 (3–9). 2 refs. [Cz.]

Presents the results of experiments made in order to find a rapid testing method, free of the usual risk of fungal infection which may upset the results of longer tests. Various means of increasing germinative energy were tried, alone and in combination, viz.: soaking in water for 24 or 48 hr., removal of the pericarp, and cutting acorns transversely into halves or quarters (of which only the basal half or quarter was put into the germinator). After such treatment, the acorns were germinated on a ½-cm. layer of moist sand in vessels having a lid with a ventilation hole, kept in a thermostat with temperature varying between 26 and 30° C. Germinated acorns were counted (*a*) when the sprouts were 3–5 mm. long and (*b*) when they were over 15 mm. long; there was no significant difference in the results, except for the longer time taken to grow to stage (*b*). The time required for a given % of acorns to germinate decreased in the order: with pericarp (entire acorns); without pericarp—whole acorns, halves, quarters. Soaking in water considerably increased the germinative energy, the quickest germination being obtained with acorns soaked for 48 hr. The cut made to sever the required quarter-acorn serves at the same time as an ordinary visual cutting test, obviously ungerminable acorns being counted and discarded, while doubtful and apparently sound ones are husked and tested in the germinator. Under optimum conditions such a test can be completed in 11–14 days. Results are shown in graphs and tables.

232.32. *Plant Rearing. Nursery Practice*

See also Nos. 3742, 3797–9, 3828, 4406.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 3565, 3782, 3784–5.

3769. Warcup, J. H. **Effect of partial sterilization by steam or formalin on the fungus flora of an old forest nursery soil.** *Trans. Brit. mycol. Soc.* 34 (4), 1951 (519–32 + 1 plate). 14 refs. O.B.D.

[Cf. *For. Abstr.* 13 (No. 1142).] With either steam or formalin treatment, fungi present in the soil were destroyed or reduced to a very low level. Recolonization of treated soil was slow, and even 18 months after treatment the number of species and the size of colonies were very much smaller than in untreated soils. Steam-treated soil was recolonized chiefly by *Mortierella* spp., *Phoma eupyrena*, and *Coniothyrium* sp. in the first year. In the second, *Penicillium* spp. and sterile fungi were also present. Recolonizing fungi were usually most abundant near the soil surface. In formalin-treated soil the recolonizing species were fewer; *Trichoderma viride* predominated, *Phoma eupyrena*, *Coniothyrium* sp. and *Fusarium* spp. also being present, particularly in the second year. Both mean height and total number of Sitka Spruce seedlings were appreciably increased by soil sterilization. ***From author's summary.***

3770. **Pine seedling root disease controlled.** *Rep. U.S. Bur. Pl. Ind. 1949/50*, 1950 (84).

Soil fumigation with EtBr has proved effective in prevention of a root disease of Southern Pine nursery seedlings. The fumigant was applied 3–5 weeks before sowing, by a tractor-drawn apparatus devised to apply it uniformly and rapidly.

3771. ZENTMYER, G. A. **Evaluation of soil fungicides for control of *Phytophthora cinnamomi*.** *Abstr.* in *Phytopathology* 42 (1), 1952 (24).

Describes a laboratory screening test that gives a good correlation with greenhouse and field results. Of the commercial products tested Dithane D-14 was the most effective.

3772. TULSTRUP, N. P. Et gødningsforsøg i Egelund planteskole. [**An experiment with fertilizers at the Egelund nursery.**] *Dansk Skovforen. Tidsskr.* 36 (3), 1951 (105–14). [Dan.]

Plots were manured with combinations of N (350 kg. $Ca(NO_3)_2$/ha.), P (150 kg. 18% superphosphate/ha.), K (150 kg. 40% K fertilizer/ha.) or NH_4 (350 kg. $(NH_4)_2SO_4$/ha.), or with stable manure or were left untreated, before planting with 2 + 0 Norway and Sitka Spruce and 1 + 0 Scots Pine, Silver Fir, Larch, Beech and Alder. Height measurements after about 18 months are shown in graphs. Beech treated with N showed increased height growth, but with NH_4 or 2K (300 kg./ha) height growth was rather below average. Alder on poor soil showed much increased height growth when treated with N + P, or with stable manure; results on richer soils were less conclusive; K reduced height growth. 2P + K + N and 2N + K + P stimulated height growth of Sitka Spruce, while 2K reduced it. Scots Pine showed an increase in height growth when treated with K, or N + P, but a reduction when treated with 2 K. Silver Fir showed reduced height growth when treated with 2K, and no definite increase for any treatment. Norway Spruce showed an increase in height growth when treated with K, but a decrease when treated with 2K, or 2N. The Larch was too much damaged by insects for conclusions to be drawn. Some figures for cost of the different fertilizers are given.

3773. **Forest nursery experiments: fertilizer trials.** *Rep. Dep. Agric. Qd. 1950/51*, 1951 (50).

In two fertilizer trials on the effect of N, H_3PO_4, and potash on *Pinus caribaea* seedlings, marked increase of growth was obtained only from phosphate. N depressed growth. Cu, Zn, B and Mo applied to the soil had no effect on the growth rate of exotic seedlings. In fertilizer trials on *Araucaria cunninghamii*, using N, H_3PO_4 and potash with and without added animal manure, positive responses to H_3PO_4 were obtained; manure-treated blocks were superior to controls. This superiority is thought to be associated either with an increase in moisture-holding properties of the soil or with an induced and more favourable microflora, as ample nutrients were supplied to the controls. In experiments using molasses and formalin as pre-planting treatments on beds that for many years had had heavy applications of sawdust, increased growth was obtained from both treatments, especially from that with molasses. The molasses treatment improved the soil structure by giving increases of 21 and 25 in the % aggregation.

3774. **[Treatment of nursery beds.]** *Rep. Dir. For. Qd. 1950/51*, [1951] (6).

Results of initial experiments in the use of filter press to maintain fertility in exotic nursery beds at Tuan Creek, Queensland, are most promising. Results to date show that equivalent applications of filter press and [farmyard?] manure have given similar responses. The filter press has the additional advantage of not introducing weeds to the nursery. Fears that its continued application might cause a pH unsuitable to mycorrhizae have been allayed by the fact that a number of mills produce a filter press having an acid reaction.

232.323. Sowing and Covering

See also Nos. 3665, 3760, 3762.

3775. SÖDERSTRÖM, N., and LUNDIN, L. **Sådd i nedsänkta fåror. [Sowing in deeper drills.]** *Skogen* 37 (5*), 1950 (51*). [Sw.]

A trial was made of sowing in drills 3–5 cm. deep, to reduce the need for watering and the danger of loss by drought. The drills were made by pressing into the soil a mould, giving drills 2 cm. broad at the base and with sides sloping at 45°. The seed was sown in June–July and covered 1 cm. deep with soil. Comparative sowings were made in normal drills, 1 cm. deep. The drills were watered only once, immediately after sowing. Results show that there were never fewer plants, and generally 20–40% more, in the deep drills. Their cost is not expected to be significantly higher.

3776. GUINAUDEAU, J. Germination du pin maritime. [**The germination of *Pinus pinaster* seed.**] *Rev. for. franç.* 1952 (5), (306–11). [F.]

Preliminary results of a current investigation at the Bordeaux Research Station give the following indications: (1) Speed of germination is in inverse ratio to the depth of covering, and total germination 3 months after sowing also diminishes with increasing depth of covering (75–85% germination for seed covered 0·5–3 cm., 73% at 4 cm., 61% at 5 cm., 25% at 6 cm., 19% at 7 cm., 12% at 8 cm., and 0 at 10 cm.). (2) Watering experiments in the greenhouse were not very precise, but indicated that germination took place with as little water as 5 g./day/25 seeds, was inhibited by 40–60 g./day and was at an optimum with 15–30 g./day. (3) Seed treated by soaking in water for several days at air temperature and then storing in a refrigerator for 3 months at 2° C., germinated much more rapidly than untreated seed (80% and 22% respectively after 21 days) and gave a higher total germination after 70 days (80% and 61% respectively).

232.325. Tending (in both Seedbeds and Transplant Beds)

3777. SORTDAL, K. K. **Litt om vatning og vatningsmateriell. [Watering and equipment used in watering.]** *Årsskr. Norske Skogplantesk. 1951*, 1952 (81–7). [Nor.]

A general description of methods and equipment.

778. HOLMES, G. D., and IVENS, G. W. **Chemical control of weeds in forest nursery seedbeds.** *For. Rec. For. Comm., Lond.* No. 13, 1952. pp. 31. 19 figs. Price 2*s*.

Describes a series of experiments against annual weeds in first-year conifer seedbeds. Soil treatments applied before or immediately after sowing showed that a number of chemicals, including $CuSO_4$, $ZnSO_4$, H_2SO_4, and $NaClO_3$ gave a considerable degree of weed control; they had a variable effect on germination and early development of conifer seedlings. Application of a 4% solution of formaldehyde at a rate of 1 gal./sq. yd. 3 weeks before sowing, not only reduced the number of weed seedlings but also increased the survival and rate of growth of conifer seedlings. The application of Na methyl-4-chloro-phenoxyacetate (MCPA) as a dust or a solution, at rates of 2–5 lb./acre, immediately after sowing, greatly reduced the germination and survival of broadleaved annual weeds, but did not kill the grasses. These application rates did no harm to Scots Pine, but Larch seedlings were severely injured. Experiments with various mineral oils, in which the weed seedlings were sprayed immediately before the emergence of the conifers, indicated that a high kill of weeds could be obtained without damage to the trees. The lighter, unfortified mineral oils, such as white spirit or vaporizing oil, gave the best results. A single application reduced the season's hand weeding by 90–95%. Applications of mineral oils after the emergence of the tree crop demonstrated that the unfortified mineral oils were the only compounds to show a high degree of selectivity between the weed and tree species. DNOC and MCPA treatments proved unsatisfactory, owing to failure to control annual grasses and toxicity to 1st-year tree seedlings. The application of vaporizing oil at 40 ml./sq. yd. or white spirit at 65 ml./sq. yd. gave a 70–80% kill of annual weeds, including grasses, without appreciable damage to first-year Pine or Spruce seedlings. Douglas Fir and Japanese Larch were severely damaged by post-emergence applications of all the oils tested. Details of the various oils used are given in an appendix. [Cf. *For. Abstr.* 13 (Nos. 256, 1340.] *From authors' summary.*

779. REGNSTER, P. **L'emploi de dérivés du pétrole comme désherbants sélectifs dans les pépinières forestières. [The use of petroleum derivatives as selective weedkillers in forest nurseries.]** *Bull. Soc. for. Belg.* 59 (4), 1952 (195–200). [F.]

Report on experiments at Groenendael in the use of Varsol and Esso Weed Killer 35 on nursery seedbeds of conifers and *Quercus* spp.

780. PALUDAN, F. **Praktiska erfarenheter vid användning av mineralolja mot ogräs i plantskolor för gran och tall. [Practical experience of the use of mineral oils against weeds in Spruce and Pine nurseries.]** *Skogen* 39 (1), 1952 (9–11). 5 refs. [Sw.]

Discusses successful results of spraying with Shell Weedkiller 10 and Esso Weedkiller 35 in Norwegian nurseries and the Swedish Forest Service nursery in the county of Gävleborg.

3781. VIDME, T. **Ugrassprøyting i skogplanteskular—norske forsøk og praktiske røynsler. [Spraying against weeds in forest nurseries—Norwegian research and practical results [with discussion].]** *Årsskr. Norske Skogplantesk. 1951*, 1952 (46–78). [Nor.]

Experiments begun in 1949 [cf. *For. Abstr.* 13 (No. 2064)] were continued. Sample plots of Norway Spruce and Scots Pine were sprayed at rates of 100 litres/dekare with Shell Weedkiller, and white spirit neat or containing 5, 10 and 20% crude turpentine, or at a rate of 50 litres/dekare with white spirit containing 20% turpentine. Spraying was done 3 times during the growing season. Results are tabulated. White spirit gave rather better results than Shell Weedkiller at all times of spraying. The addition of 5% crude turpentine made no significant difference, but white spirit with 10 and 20% turpentine added gave significantly better results than white spirit alone, especially on *Matricaria inodora* and *Senecio vulgaris*. Fifty litres/dekare of white spirit containing 20% turpentine gave results almost as good as 100 litres/dekare of Shell Weedkiller. White spirit was no more harmful to the conifer plants than Shell Weedkiller. The addition of turpentine to the white spirit increased the damage to plants, but for the addition of 5 and 10% turpentine the difference in damage was slight. Damage was most severe after the first spraying in June, and no damage was noticed from the third spraying late in August or early in September. Further experiments were made in 1951, using Shell Weedkiller, white spirit, white spirit with 10% crude turpentine, Pac (a new American weedkiller containing a polychlor-aryl-alkyl-carbonate, both in white spirit and in water, and potassium cyanate in water). White spirit gave good results against the weeds, but caused 2·2% damaged needles and 1·2% killed conifer plants as against 1·1 and 0·6% respectively for Shell Weedkiller. The addition of 10% crude turpentine to the white spirit reduced the time needed for weeding still further, but increased needle damage to an average of 3·5% for all sample plots, although if one plot where damage was unusually severe be omitted, the average was only 0·67%. The addition of 1·5% Pac to the white spirit gave still better results against weeds, but damage to needles was 40% and nearly 8% conifer plants were killed. Pac in water damaged the conifer plants seriously but had little effect on the weeds; the same was true of potassium cyanate in water. Conclusions drawn are that: (1) Mineral oils of the white-spirit type are effective and can safely be used among Spruce and Pine except in the first 2 months after germination in seedbeds or while the shoots are still new among older plants. Late June to mid-July are the most risky periods. Further experiments on the effect of crude turpentine on the conifers are needed before its use in white spirit can be recommended. (2) Quantities needed will vary with the weed species, but generally 60–80 litres/dekare will be sufficient. (3) Spraying should be done as soon as possible after germination of the weeds. Results of the use of weedkillers in practice in some Norwegian nurseries are also tabulated; these confirm the experimental results.

3782. KOPITKE, J. C., and LANGFORD, J. K. R. **Weed control [in forest nurseries] with methyl bromide.** *J. For.* 50 (3), 1952 (208–11).

Experiments at Elsberry, Missouri, in control of weeds in nursery beds by fumigating the soil with MeBr at a rate of 1 lb. 100 sq. ft. gave almost complete control of weeds as well as excellent control of damping-off organisms. Costs, including labour and depreciation of equipment over a 3-year period, amounted to $335·00/acre year; and the net saving in weeding costs during three growing seasons was $550·00/acre. Various kinds of paper were tried as cover under which to apply the fumigant, but none was satisfactory. Tarpaulins of polyethylene or vinyl plastic were effective. These can easily be mended, and with reasonable care should last for several years. Methods of application are described in detail. [Cf. *For. Abstr.* 13 (No. 263).]

3783. **Mulch studies: cone mulch trials.** [*Bienn.*] *Rep. Ore. St. For. 1948 49–1949 50*, [1950] (77).

The results of an experiment to determine the usefulness of cones of several tree species as a mulch indicate that, although the cones decompose slowly, there is little likelihood of their causing N starvation in the soil, and they should have a high humus-forming capacity.

232.327. Protection Measures in Nurseries

See also Nos. 3769–71, 3973–4, 4019.

3784. STRONG, F. C. **Damping-off in the forest tree nursery and its control.** *Quart. Bull. Mich. agric. Exp. Sta.* 34 (3), 1952 (285–96). 4 refs.

In trials carried out on Red Pine in the nursery and in the greenhouse over 3 years, 25 fungicides were tested by 3 methods—dusting the seed before sowing, and application to the soil before and after sowing. In 7 trials Crag 658 (containing copper-zinc chromate) was successful in controlling damping off when used as a seed dust. Tersan (containing tetramethyl thiuram disulphide), Experimental fungicide 5400, New Improved Ceresan (containing ethyl mercury phosphate) and Ceresan M (containing ethyl mercury *p*-toluene sulphonanilide) plus KI, and Manzate (containing manganese ethylene bisdithiocarbamate) showed considerable promise when mixed with the soil at the rate of 150 lb./acre before sowing. Tersan applied in water by a sprinkle treatment after sowing in 3 applications of 50 lb./acre at weekly intervals, controlled damping off well.

3785. MIKOLA, P. **Effect of forest humus on parasitic fungi causing damping-off disease of coniferous seedlings.** *Phytopathology* 42 (4), 1952 (202–3). 10 refs.

Pinus banksiana was grown at Wisconsin University Soils Department in pot cultures consisting of sand infected with *Pythium ultimum* and *Rhizoctonia solani*. A number of the pots were treated with humus collected under three different forest types. The addition of humus at a reasonably high rate reduced seedling loss by ca. 100%. Experiments in growing cultures of the fungus in synthetic media with and without humus extracts indicated that there is no specific antibiotic substance present in the humus. The greater resistance of seedlings grown with humus seems to be due to strengthening of the tissue of the young roots, and the consequent shortening of the period of seedling susceptibility.

3786. GAMBRELL, F. L., and HEIT, C. H. **Soil chemicals in evergreen seedbeds.** *Amer. Nurserym.* 95 (10), 1952 (9–10).

Seedbed areas were treated with (*a*) DDT at 25 lb./acre, (*b*) chlordane at 10 lb./acre, (*c*) BHC at 5 lb./acre, or (*d*) left untreated, and then sown with Austrian Pine seed. Germination was complete after one month on all plots, with no difference in total %. At the end of the 1st growing season losses were (*a*) 17·5%, (*b*) 22·8%, (*c*) 70·4%, and (*d*) 26·8%. The seedlings were lifted, measured, and weighed at one year old and it was found that average green weight in grams and length of roots in inches were respectively (*a*) 24·4; 6·0, (*b*) 21·2; 4·3, (*c*) 5·9; 2·7, and (*d*) 18·6; 4·8. More root rot occurred on (*d*) than on (*a*). The effect of treatment on infestation by the strawberry root weevil (*Brachyrrhinus ovatus*), against which it was designed, is not stated.

232.328. Vegetative Propagation

See also Nos. 3608, 3617, 3621, 3665.

3787. PAJCHL, J. **Zakořeňování zelených modřínových řízků. [Rooting of green Larch cuttings.]** *Čsl. Les* 31 (8), 1951 (181–2). 3 refs. [Cz.]

An account of experiments made in the summer of 1950 in the Forest Nursery Establishment at Kostelec without using heteroauxin or other stimulants. The soil was fine sand with a large proportion of loam, spread on a hotbed; a crust soon formed on which moss grew. The cuttings, 4–5 cm. long, were taken from the side branches of 1½-year-old Larch and planted 0·5–1 cm. deep at 2 × 2 cm. spacing, in late July and mid-August. After planting, the hotbed was closed and shaded, the shading not to exceed a fortnight. The cuttings were watered once daily. All struck root and survived.

3788. BODMAN, P., MEE, J., and BREADON, R. **Rooting of Douglas Fir cuttings as influenced by age of parent trees and the use of rooting hormones.** *Res. Notes U.B.C. For. Club* No. 5, 1952. pp. 3 + 2 gphs.

Of a number of growth substances tested, indolebutyric acid and Hormodin 3 (a commercial preparation containing indolebutyric acid) were most successful in promoting rooting. Best rooting was exhibited by cuttings from trees 20 years old.

3789. DORAN, W. L. **The vegetative propagation of Hemlock.** *J. For.* 50 (2), 1952 (126–9). 4 refs.

Cuttings of *Tsuga canadensis* rooted better if taken from 1st-year than from 2nd- or 3rd-year wood. Untreated cuttings gave a relatively poor % of rooting, and rooting was markedly increased by treatment with indolebutyric or α-naphthaleneacetic acid. Best results were obtained with cuttings taken from mid-August to late January. Rooting was increased by dipping cuttings in the fungicidal powder Phygon XL (50% 2,3-dichloro-1,4-naphthoquinone). Other fungicides were ineffective. Rooting of cuttings of *T. caroliniana* and *T. sieboldii* was also improved by the use of indolebutyric acid.

3790. McClure, F. A., and Durand, F. M. **Propagation studies [with Bamboos].** *Rep. fed. Exp. Sta. Puerto Rico* 1951 (34).

Branch cuttings 1, 2 and 3 years old were prepared for 8 species, and planted in a propagating medium of coco-peat and sandy loam. All cuttings, except those of *Bambusa ventricosa*, without germinating buds or living plants attached to them, were dead one year later. All age groups of cuttings of *B. longispiculata*, *B. tuldoides* and *Dendrocalamus strictus* failed to root. Older cuttings of *B. textilis*, *B. ventricosa* and *Gigantochloa apus* gave better results than younger ones, and cuttings in the middle age group of *B. tulda* and *Bambusa* sp. rooted best. The principal problem was the slowness of basal buds to break their dormancy. A relatively high % of cuttings of *B. ventricosa* planted in unshaded beds remained alive. The basal buds of a number of cuttings began to germinate a full year after planting. [Cf. *For. Abstr.* 13 (No. 267).]

3791. Wyman, D. **Layering plants in Holland.** *Amer. Nurserym.* 95 (10), 1952 (7, 57).

Gives a list of woody species and genera difficult to propagate by cuttings, which are regularly propagated by layering in Holland.

3792. Solignat and Venot. Multiplication végétative du châtaignier. [**Vegetative propagation of Chestnut.**] *C.R. Acad. Agric. France* 39 (6), 1952 (263–6). [F.] A.P.B.

Reviews experiments in the vegetative propagation of Chestnut. Layering is the only method which has been really successful. Grafts are frequently made in order to increase the number of basal shoots. The one-year-old shoots from the graft are strangulated in June with 1·5–2 mm. diam. wire, and the shoots are earthed up to a depth of 20–25 cm. in July. After two years' growth the rooted shoots are separated from the main stem. Rooting capacity varies with species and within species; *Castanea sativa* roots more easily than *C. crenata*, and the latter more easily than *C. mollissima*. The significance of these methods in propagating disease-resistant strains is discussed. [Cf. *For. Abstr.* 11 (No. 2523); 13 (No. 3621).]

3793. Fischer, F. Massnahmen gegen Kastaniensterben im Tessin. [**Measures against Chestnut blight (*Endothia parasitica*) in the Ticino.**] *Schweiz. Z. Forstw.* 103 (3), 1952 (103–6). [G.]

Describes a method of propagating disease-resistant strains of *Castanea sativa* by layering coppice shoots with the use of growth substances (1% indolylacetic acid in talc powder).

3794. Hadders, G. Ympning av tall på friland. [**Grafting Pine in the open.**] *Skogen* 39 (2), 1952 (26–7, 41). [Sw.]

Grafts were made between 7 May and 5 July 1951 in different districts in Sweden, some on 4- to 8-year plants in regeneration areas and others on 5- to 6-year plants in nurseries. The grafts were examined in July and September and were to be examined again in spring 1952. The methods used were: slit grafting, spliced side grafting, veneer crown grafting, 'T-incision grafting' [in which the scion is inserted into a T-shaped incision in the bark similar to that in shield budding] and 'triangular grafting' [in which two downward cuts of the same length and meeting at right angles are made in the scion from the same height, and the scion is inserted into a matching wedge-shaped cut in the stock]. Results show that: (1) Grafting can be done at any time up to early July and probably August, once the stock is growing strongly. (2) Spliced side grafting is most suitable for stocks up to pencil thickness, slit grafting for rather thicker stocks, and veneer crown grafting or 'triangular grafting' for stock over 1½ cm. in diameter. All these methods were successful, but 'triangular grafting' proved difficult in practice. Spliced side grafting is probably the most generally successful and has the advantage that if the graft fails, the stock can generally be used again for slit or crown grafting. (3) The extent to which the stock is cut back does not seem to affect the strength of the union, but the scion grows more vigorously on a stock that has been cut back hard.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See No. 3765.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 3556, 3738, 3808–11, 3814, 3817–8.

3795. **Direct seeding in the Ponderosa Pine region.** [*Bienn.*] *Rep. Ore. St. For. 1948/49–1949/50*, [1950] (48).

Several hundred acres of cut-over Pine were sown with Ponderosa Pine, both broadcast and by spot sowing with mechanical hand planters. Adequate rodent control was obtained and germination was excellent. Seedlings persisted vigorously until the onset of the usual hot, dry weather of early summer. In the 3 years from germination, 98% of seedlings were lost. This prohibitive loss of seedlings has been confirmed by observation of natural regeneration on old burns and cut-over areas. [Cf. *For. Abstr.* 10 (Nos. 208–10).]

3796. Roe, A. L., and Boe, K. N. **Spot seeding on a broadcast-burned Lodgepole Pine clear cutting.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 108, 1952. pp. 2.

Results (67% of the spots were stocked with one or more seedlings at the end of the 2nd growing season) show that Lodgepole Pine can be spot-sown successfully on freshly clear-felled and burned land when rodents are absent and weather conditions are favourable during the early growing season. Rodents were successfully controlled by poison bait in the planting area and in a ¼-mile buffer zone.

232.4. Formation of Stands by Planting

See also Nos. 3738, 3828.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also No. 3737.

3797. **O plantio de tôco na sucupira.** [**Stump planting of *Bowdichia virgilioides*.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (155). [Port.]

B. virgilioides is difficult to plant out because of its extremely long tap root. If, however, when the seedling stem has attained the thickness of a pencil, the bottom of the root is pruned off, and the stem cut back to a height of 2–2½ cm., there is a fair prospect of a 100% take.

3798. LINDBERG, S. O. Ny metod för förvaring av skogsträdsplantor. [**A new method for storing plants.**] *Skogen* 38 (12*), 1951 (128*–30*). [Sw.]

The 'Koldär' system of maintaining a low air temperature in storage rooms was installed in 1951 at Bräcke nursery in E. Jämtland, where the snow melts early and planting stock may have to be lifted some weeks before it can be planted in other parts of the county where the snow melts later. The 'Koldär' system is thermostatically controlled; when the air temperature outside drops 1° C. below that in the storage room (which is well insulated), ventilators are automatically opened and fans, which draw in the colder and expel the warmer air, are set in motion. When the temperature outside rises to that of the storage room, or when the storage room reaches the lowest temperature desirable for plant storage, the fans automatically stop and the ventilators close. Graphs are given showing the temperatures inside and in the open over several months. There is little danger that the plants will dry out, because the fans are working for comparatively short periods, and the air introduced is generally damp night air. It is too early yet to give any very definite opinion on the system's success, but 2 + 1 Pine plants were stored for 10 weeks during the summer of 1951 without any sign of terminal-shoot growth or of mould forming.

An electrical heating apparatus placed near the fans warmed the air withdrawn from the storage room; this warm air was used to heat the sorting room during the day, or in the seed-drier.

3799. THORKILDSEN, R. Emballasje og forsendelse av skogplanter. [**Packing and despatching forest plants [with discussion].**] *Årsskr. Norske Skogplantesk. 1951*, 1952 (19–26). [Nor.]

Gives details of costs for different packing methods.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

See also Nos. 3814–6, 3826.

3800. **Tree-planting machines.** U.S. Forest Service. 1951. pp. 10.

A list of tree-planting machines now commercially available in the U.S.A. and Canada, with brief descriptions and prices.

3801. **Reforestation methods with emphasis on the planting of Pine tree seedlings.** *Circ. Tex. For. Serv.* No. 25, 1950. pp. 12.

Describes the use of tree-planting machines.

3802. Sovětské sázecí stroje. [**Soviet planting machines.**] *Čsl. Les* 31 (22), 1951 (500–3). [Cz.]

An illustrated description of three new machines for forest planting, made and used in the U.S.S.R. The SLČ-1 only digs holes and covers the plants with earth; the SLN-1 also delivers the plants to the furrow; and the LP-5 can plant on uncultivated soil (e.g. felling sites with stumps etc.).

232.43. *Spacing and Arrangement in Plantations*

See also No. 3737.

3803. WIELICZKA, Z. Compasso, qualidade e rendimento das plantações de pinho brasileiro. [**Spacing, quality and yield of *Araucaria angustifolia* plantations.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (283–90). [Port.e.]

A comparison (of height, diameter, bark thickness, knottiness, volume of merchantable timber etc.) was made of *A. angustifolia* trees growing at different spacings. A 1 × 1 m. plantation showed a height growth at 7 years practically equivalent to that of a 2 × 2 m. plantation at 15 years. Yield from a 2 × 2 m. plantation managed on a 10-year rotation would be 130 cu.m. pulpwood/ha. [Cf. *For. Abstr.* 13 (No. 4108).]

3804. STAHELIN, R. **Effect of spacing on quality of lumber [of Southern Pines].** [*Bienn.*] *Rep. Ala. agric. Exp. Sta. 1947–48*, 1950 (28–9).

Includes a table showing relation between spacing and degree of knottiness in the first 16-ft. log of 16-year-old plantation Pines. [Cf. *For. Abstr.* 13 (No. 3741).]

3805. NELSON, T. C. **Early competition in Slash Pine plantations.** *Res. Note Stheast. For. Exp. Sta.* No. 10, 1952. pp. 2. 1 ref.

Results of a study in Slash Pine indicate that competition in 6 × 6-ft. plantations may begin by the third year after planting. Diameter growth of individual trees is reduced but height growth after 7 years is not affected. Results showing d.b.h. and b.a. for 2–7 years after planting at 6 × 6 and 12 × 12 ft. are given in a graph.

232.44. *Season and Time of Planting*

See also No. 3812.

3806. MORK, E. Planteforsøk med gran (*Picea abies*) til forskjellige tider i vegetasjonsperioden. [**Planting experiments with Spruce at different times during the growing season.**] *Medd. norske Skogforsøksv.* 11 (1) (No. 38), 1951 (31–77). 4 refs. [Nor.e.]

Planting experiments were made over a period of 10 years, in 7 districts of SE Norway and Trøndelag. Particulars are given of climate and soil of each site. The times of planting extended from 1 May to 15 October. Results were assessed on the basis of % survival two growing seasons after planting. In normal conditions planting in SE Norway and Trøndelag between 1 May and 1 September will give satisfactory results, later planting inferior results. Best seemed to be spring (May) and early autumn (August) planting, and in unusually dry summers spring and late autumn (1 September–19 October). In SE Norway, where there is a period of drought in early summer, planting should not be done during June. In Trøndelag, planting can be done continuously from spring to 1 Sept. In light shallow soil, which dries out easily, planting should be done in wet weather in late summer or autumn.

3807. JUNACK. Betrachtungen zur besten Pflanzzeit der Douglasie. [The best time for planting Douglas Fir.] *Forst u. Holz* 7 (6), 1952 (78–80). [G.]

According to the results of trials made in the Gartow district, the best time for planting bare-rooted stock is from the end of April to the beginning of May; the next best, from mid-August to the end of September. Autumn and winter planting of bare-rooted stock should be completely avoided. With ball-planting the season is less important and autumn and winter plantings may be made, though the late summer is preferable.

233. *Afforestation*

See also Nos. 3664, 3750, 4471.

3808. MAURY, R. Un essai de reboisement sur banquettes de restauration du sol au Mont Ventoux. [An experiment in afforestation on [illegible] contour trenching on Mont Ventoux.] *Rev. franç.* 1952 (3), (176–85 + 5 photos).

Describes the method of trenching by bulldozer. Sowings of 'Cedar', and *Pinus nigra* var. *calabrica* and *austriaca* show good initial survival.

3809. DRAŠKOVIĆ, D. Staništa [illegible] područja Šargana kao polazne tačke [illegible] njemu. [Habitat and phytocoenoses [illegible] forests.] *Šumarstvo* 4 (2), 1951 [illegible].

Presents the results of a study [illegible] (western Serbia, [illegible] and Drina), where [illegible] undergone severe [illegible] felling and grazing. [illegible] reforestation methods. [illegible] ca. 14,500 ha., denuded [illegible] ca. 60%, neglected forests and maquis [illegible] arable land to 20%. Mean temperatures: January 0·8° C., July 21·2°, annual 10·7°; annual precipitation (mostly snow) 850 mm., altitude range 420 to 1,544 m. The upper limit for Oak forests is 1,100 m. on southern slopes; the corresponding northern slopes carry degenerate, low Beech forests. The parent materials of the soils are serpentine peridotite, marl, limestone, and locally Upper Cretaceous sandstone. The author makes the following recommendations: for protection against torrents, avalanches and landslides, parallel rows of large stones are set contourwise at distances of 4–6 m., after which sowing in pits is carried out, the interspaces being sown with *Vicia sativa*; on completely denuded areas, *Vicia sativa* in mixture with local meadow grasses and *Rhus* sp., sown in narrow horizontal furrows; on partly denuded areas, broadcast sowing of the same grasses along with *Betula verrucosa*. Sowing (and planting) must generally be done in spring. Areas with some vegetation of *Rhus* and *Fraxinus ornus* can be sown or planted with *Pinus nigra* after soil working. Where ferns are predominant, light-demanding species should be planted. Monocultures are to be avoided.

3810. SOLJANIK, I. Povodom pošumljavanja nekih goleti u istočnoj Srbiji. [On the afforestation of some denuded areas in eastern Serbia.] *Šumarstvo* 4 (2), 1951 (104–14). [Serb.e.f.]

Describes instances of afforestation practice in eastern Serbia during the last 20 years. (1) Ten ha. were planted in 1930–5 with *Pinus nigra* and *Robinia pseudoacacia* on a small hill near Knjaževac. After 15 years, *P. nigra* (on shallow soil) attained a height of 7–10 m. and a d.b.h. of 10–15 cm. *R. pseudoacacia* showed stunted growth on shallow soil but developed much better on deep soil. (2) In autumn 1932, an area in the Timok district, altitude 600 m., was planted with *R. pseudoacacia*, *Fraxinus americana*, *Acer negundo* and *Juglans regia*, and sown with *Quercus sessiliflora* and *Q. pubescens*. Planting was in furrows (*Robinia* also in pits). Acorns were sown with a mattock, and also in strips 0·5 m. wide and 15–20 cm. deep along the contour. The crop was weeded and cultivated in the 1st and 2nd years. [illegible] *Fraxinus*, *Acer negundo*, and pit-planted *Robinia* have disappeared; furrow-planted *Robinia* [illegible] high and [illegible] d.b.h. of 15–20 cm. [illegible] Oak, while furrow-sown [illegible] 5 m. [illegible] *Fraxinus* bears seed, but is rather stunted (up to 3 m. high); *Robinia* remains stunted; Oak is fair (up to 4 m. high, and 10 cm. d.b.h.); Pine is up to 10 m. with a closed canopy, and has been thinned. (5) An area of 12 ha. (Timok district) was planted in autumn 1949 and spring 1950 with 1-year-old *Robinia* (pits and 'nests') and 2-year plants of *Pinus nigra* (pits only). A severe drought followed and by autumn 1950, 85% of the Pine were dead, whereas 50% of the *Robinia* planted in pits that spring had survived and were 18–50 cm. high. Close by and on the same soil, *Robinia* was planted in nests; survival in autumn 1950 was 98%, and the height of plants was 35–120 cm. (6) An area of 30 ha. near Zaječar was planted in autumn 1949 with *Robinia* (25 ha. in pits, 5 ha. in nests). The soil was shallow and stony, the aspect S. One year later, after the great drought, pit survival was 10%, nest 85%. The author believes that the classical pit-planting advocated by German and Austrian foresters cannot be advantageously applied in Jugoslavia where environmental conditions are completely different.

Other sections of the paper deal with the preliminary preparation of the soil and with the choice of species. Previous investigations, particularly those of the Belgrade Institute of Forestry, with plantings of *Acer dasycarpum*, *A. pseudoplatanus*, *A. platanoides*, *A. negundo*,* *A. campestre*,* *A. tataricum*,* *Fraxinus excelsior*, *F. ornus*,* *F.*

americana, Quercus robur, Q. sessiliflora, Tilia platyphyllos, T. cordata, Morus* sp.,* *Celtis occidentalis, Juglans nigra, Castanea sativa, Aesculus hippocastanum, Ulmus glabra,* Maclura pomifera,* Prunus serotina, Robinia pseudoacacia,* Gleditsia triacanthos,* Ailanthus altissima,* Sophora japonica,* Gymnocladus canadensis*, and *Pinus nigra* in 1947–50, have shown that, on N aspects, the survival of all species in the autumn of 1950 (after the drought) was 65–95%, while only 13 species, viz. those asterisked above, plus *Quercus cerris*, survived to more than 50% on S aspects. Other species, even those planted in 1947–8, perished.

3811. Jevtić, M. Crni jasen kao pionir u Ibarskoj Klisuri. Neka zapažanja u vezi sa setvom crnog jasena u prošlogodišnjoj jesenjoj akciji pošumljavanja. [***Fraxinus ornus* as a pioneer species in the Ibarska Klisura. Some observations in connexion with the sowing of *F. ornus* in the afforestation campaign of last autumn.**] *Šumarstvo* 4 (2), 1951 (115–8). [Serb.e.f.]

The Ibarska Klisura is a defile abounding in steep slopes with very sparse skeletal or skeletoidal soils over serpentine. The average annual rainfall is 600–700 mm. (sometimes 400 mm.), and one heavy summer fall can account for as much as 96·2 mm. Strong insolation and dry winds contribute to the aridity of the climate. The following forest associations are found in the area: (1) *Carpinetum orientalis serbicum*, (2) *Ostrya carpinifolia/Fraxinus ornus/ Quercus lanuginosa*, (3) *Quercetum conferto-cerris*, (4) *Quercetum montanum serbicum*, and (5) *Fagetum montanum serbicum. Fraxinus ornus* is the main species of (2) and an important component of (1), (3), and (4), thus being the most constant component of all these associations. In spite of its small increment and modest dimensions it ought to be used extensively as a pioneer species in reforesting the Ibarska Klisura, and ca. 8000 kg. *Fraxinus ornus* seeds were sown there on ca. 600 ha. in autumn 1950. The method used was patch sowing, with patches ca. 1 × 0·3–0·5 m., contourwise at 1-m. intervals. On partly denuded sites, patches are made only in places covered with soil. On very steep slopes, shallow ditches are dug contourwise every 2 m. The quantity of seed used should be 10–15 kg./ha.

3812. Bramble, W. C. **Reforestation of strip-mined bituminous coal land in Pennsylvania.** *J. For.* 50 (4), 1952 (308–14). 5 refs.

An analysis has been made of the more important site factors which affect tree survival on spoil banks in Pennsylvania. Soil acidity and fine-soil content of the spoil material, wind exposure, soil temperature, slope, and parent material must all be taken into account in planting plans. Natural development of vegetation has been a slow process on most spoil areas. An Aspen/Fire Cherry community is the initial stage on unlevelled banks. Natural stocking with trees has been inadequate on spoil banks less than 10 years old on 40% of the areas studied. Spring and fall planting tests, plus a plantation survey have indicated that successful reforestation is possible in both seasons with a number of tree and shrub species. Levelling and planting of stripped areas are prescribed in the current Pennsylvania law regulating strip mining. Much reclamation activity has resulted in the last two years as a direct consequence of that law, and forest tree planting forms a major part of the programme. [Cf. *For. Abstr.* 12 (No. 298).] *Author's summary.*

3813. Finn, R. F. **The nutrient content of leaves and tree growth as affected by grading on three strip-mined areas.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 70, 1952. pp. 2. 1 ref.

Growth of *Fraxinus americana* and *Liriodendron tulipifera* was significantly better on unlevelled than on levelled parts of a limestone and clay area with a pH of 6·8–8·0, but there was no significant difference in growth between levelled and unlevelled parts of an area of sandstone, silty shale and clay with a pH of 5·5–7·0 and another of silty shale with a pH of 4·0 or 6·5. There were, however, no significant differences in any area between leaf contents of N, P, and Ca. Results showing tree height and nutrient content of leaves 4 years after planting are tabulated.

3814. **Planting strip-mined areas in north Alabama.** *Rep. Sth. For. Exp. Sta. 1951* [1952] (14–5).

After 5 years, trial plantings of Loblolly Pine on newly created (1-year-old) spoil banks averaged 8·2 ft. in height with a survival of 86%, as against 5·4 ft. and 69% for Shortleaf and 3·1 ft. and 19% for Longleaf Pines. Application of fertilizer to Loblolly Pine did not improve height growth enough to justify its use. Sycamore [*Platanus occidentalis*] planted along the edge of ponds created by open-cast mining had an average height of 10·1 ft. and survival of 93%; Sweetgum might do well on these moist sites. Spot sowing of the three Pines failed.

3815. Buller, G. B. **Planted Loblolly Pines respond to mulching.** *J. For.* 50 (4), 1952 (317–8).

Loblolly Pine was planted in 1937 on badly eroded land in Tennessee, alternate strips about 25 ft. wide, more or less on the contour, were mulched with 2–4 in. of wheat straw at the time of planting. Observations made in 1951 showed that survival on mulched and unmulched strips was 100% and 53% respectively; corresponding figures for mean height were 21 ft. and 11 ft. and for mean d.b.h. 4 in. and 2·5 in.

3816. Cooper, G. R., and Aikman, J. M. **Some responses of Black Locust to planting site treatment.** *Proc. Iowa Acad. Sci.* 57, 1950 (73–90). 17 refs. A.P.B.

One-year-old nursery plants of *Robinia pseudoacacia* were planted on eroded Lindley loam near the lower end of a long SE-facing slope. Four planting methods were used; (1) and (2) involved no site preparation, and (3) and (4), bench terraces formed by ploughing 4 furrows on the contour. These were given the following treatments for a period of 2 years: (1) plants kept free of competition by hoeing, (2) a 4-in. straw mulch given in spring, (3) hoed, (4) cultivated by ploughing.

Growth data show a definite increase in growth rates of (2)–(4), as compared with (1), a lead that was still maintained 7 years later. The growth curves of

(4) showed no levelling off as did the other three. Locust borer only lightly affected (3) and (4). Survival was highest in (4) and lowest in (1). Amounts of extractive in the sapwood decreased as the intensity of treatment increased. The treatments appear to have affected the trees mainly by their influence on available soil moisture, and degree of soil aeration.

3817. PLASS, W. T. **Direct seeding tests on old fields in southeastern Ohio.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 71, 1952. pp. 2.

Seed of 4 Pines and 4 hardwoods was sown in a total of 1200 seed spots, subjected to different forms of ground preparation, during the spring and autumn of 1950. At each hardwood seed spot a total of 25 seeds was sown, comprising 2 *Juglans nigra*, 3 *Quercus borealis*, 10 *Fraxinus americana* and 10 *Liriodendron tulipifera*. Each Pine seed spot was sown with 15 seeds each of *P. echinata*, *P. resinosa*, *P. strobus* and *P. banksiana*. Results showing the % of successful seed spots, based on the number of seed spots with at least one seedling, by species and method of ground preparation, are tabulated. In general, hardwoods were more successful than Pines, and autumn sowings than spring sowings. Ground preparation did not affect the results. *J. nigra* and *Q. borealis* show promise for old-field sites, and *P. echinata* and *F. americana*, though they show poorer results, offer some possibility.

3818. DENUYL, D. **Tree growth records for Indiana's first State Forest.** *Proc. Indiana Acad. Sci.* 60, 1950 (93–6). 2 refs. A.P.B.

Direct sowing and planting of hardwoods were begun on old fields, the site of Indiana's first State Forest, in 1903. A review of the history of the stands and their present condition show that old fields are not suitable for planting and sowing hardwoods, but that, with proper care and management, a Pine crop can be grown and natural hardwood succession encouraged.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 3956, 4094.

3819. **Underplanting: North Mississippi.** *Rep. Sth. For. Exp. Sta. 1951* [1952] (9–11).

Average height growth and survival for 5 species of Pine and Eastern Red Cedar planted under low-grade upland hardwoods was greater during the 2nd and 3rd growing seasons for released than for unreleased seedlings. Damage by *Rhyacionia frustrana* was greater on released and that by *Tetralopha robustella* on unreleased plots. Third-year height growth and survival of 6 hardwoods used in underplanting was also greater on released than unreleased plots. Release before or immediately after planting is desirable.

3820. KÖSTLER, J. N. Gemischte Wälder—süddeutsche Beispiele zur Problematik ihrer Pflege und Begründung. **[Mixed forests—south German examples of problems connected with their establishment and care.]** *Forstwiss. Cbl.* 71 (1/2), 1952 (1–17). 8 refs. [G.]

Discusses problems of regenerating and tending mixed stands, with numerous examples and illustrations from Southern Germany.

3821. ANDERSEN, M. Balancen i blandningsbevoksninger af rød- og sitkagran. **[The balance in mixed plantations of Norway and Sitka Spruce.]** *Dansk Skovforen. Tidsskr.* 36 (1), 1951 (1–44). [Dan.]

An examination was made of 23 plantations, subdivided by site factors into 76 groups, of Sitka and Norway Spruce, 12–36 years old. The Sitka Spruce, generally only in its first generation in Denmark, showed within a plantation much greater deviation from the average height and diameter than Norway Spruce; this was true when either Norway or Sitka Spruce was dominant or when they were of equal status. A study was made of the effect of such factors as light, winter temperature, drought, soil, position, height above sea level, damage by wind, and disease, on the balance between the two species; Sitka Spruce was found to be more susceptible to most of these factors especially in the early stages of stand development. Important site factors for Sitka dominance are a northern slope, good shelter, and a light, moist, deep soil. Older plantations (40–70 years) showed better increment from Sitka than from Norway Spruce. Studies of the mixture needed to obtain a final stand of pure Sitka showed that on favourable sites 1 Sitka to 4 Norway Spruce should be enough, while on less favourable sites a proportion of 1 : 1 would be needed. Sitka Spruce should not be planted on sites with high, stagnant ground-water, with stiff clay or hard sand, with very dry soil or with deep peat.

3822. KRIŠKA, S. Úvaha o miešanosti buku s červeným smrekom. Úvaha o miešanosti červeného smreku s inými drevinami. **[Note on a mixture of Beech with Larch. Note on mixtures of Larch with other tree species.]** *Pol'ana* 5 (1; 2), 1949 (5–7; 24–6). [Slovak.]

I. Describes a mixed stand near Tisovec (Slovakia). An old Beech stand was clear-felled in 1887, leaving only Beech seedlings here and there. Larch regenerated naturally on this area from adjacent stands, and any residual gaps were finally planted with Spruce. The mixed stand grew in favourable conditions: wild animals were absent and grazing moderate. At ca. 60 years old it contained 556 Beech, 153 Larch, and 27 Spruce stems/ha, density 0·9. The b.a. (sq. m.), height (m.), volume (cu.m.), and d.b.h. (cm.), of the average tree were, respectively: Beech 0·030; 19·6; 0·258; 19; Larch 0·135; 29·5; 1·750; 41; Spruce 0·093; 24·4; 1·17; 34. The altitude of the site is ca. 500 m., aspect N, slope 1/3, rainfall 700–750 mm., with deep soil over weathered gneiss. The average volume increment is ca. 7 cu.m./ha., equivalent to 7·8 cu.m./ha. for a density of 1. These good results lead the author to believe that the poor results of introducing Larch into the state forests of Slovakia are due to unfavourable conditions, the seeds getting little chance of germinating and developing; clear-felled sites are not prepared for sowing, while in colder, shaded places the seedling is unable to develop. Such as do survive get destroyed by animals.

II. Presents the results of a mensurational analysis of several sample plots in the Svarin state forests (upper Cierny Vah), altitude 800–900 m., aspect N, slope 4/9, shallow soil over limestone, site quality III/IV, age of stands 65–70 years. The following figures denote: number of stems/ha.; basal area (sq. m.), height (m.), and volume (cu.m.) of the average stem. Beech 386; 0·0202; 17·26; 0·193; Sycamore (*Acer pseudoplatanus*) 50; 0·0187; 15·65; 0·115; Spruce 339; 0·0326; 19·65; 0·38; Silver Fir 218; 0·0309; 17·12; 0·355; and Larch 219; 0·0735; 26·61; 0·954.

3823. KRIŠKA, S. Ďalši dôkaz vel'kej tvorivosti čeryeného smreka. **[Further proof of the great yield of Larch.]** *Pol'ana* 7 (6/7), 1951 (133–4). [Slovak.]

Describes a 121-year-old mixed stand in the Masaryk Forest of the University of Agriculture at Brno (Moravia). The sample plot was 50 × 50 m., density 1·0, site class II, aspect NW, average slope 1/10, altitude 400–440 m., soil somewhat gravelly, weakly podzolized, with a 3-cm. layer of litter; associations *Fagetum caricetis pilosae* and *Fagetum nudum*. Out of the 360 stems (basal area 46·640 sq.m./ha.), Larch was represented by 88 stems (b.a. 21·548 sq.m./ha.). Average height (in m.) and d.b.h. (in cm.) for the 5 species were: Larch 43, 56; Spruce 39, 55; Pine 36, 50; Beech 30, 30; and Hornbeam 21, 36.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See also No. 3959.

3824. CHAPMAN, H. H.; ROBERTSON, D.; HINDS, H. V. **The treatment of natural reproduction of *Pinus radiata*.** *N.Z. J. For.* 6 (3), 1951 (254–6).

Comprises (1) a note by H. H. Chapman on natural regeneration of *P. radiata* at Monterey, (2) an account by D. Robertson of methods used in Chile to thin profuse natural regeneration of this species after clear felling, and (3) a comment on (2) by H. V. Hinds, with a note on thinning of natural regeneration on cut-over or burnt areas in New Zealand. The programme adopted in Chile is as follows: The first thinning is done at 2 years old, reducing the density to 2500–3000/ha., the second 10 years later to 2000/ha., the third 5 years later to 1500/ha., and two more thinnings over the next 10 years to 700–900/ha. (280–365/acre). The first thinning is made with a long-handled knife and the later ones with the axe. In New Zealand the first thinning must be done at about 3–4 years after felling or burning; if it is done sooner there is the possibility of re-stocking from delayed germination, and after this age the density of the seedling stand and (in burnt-over areas) the falling of old trees make operations almost impracticable. Response to release is much reduced if thinning is postponed too long.

237. *Amelioration of Forest Sites*

See also Nos. 3565, 3844, 3949, 4071.

3825. NĚMEC, A. **Meliorace degradované lesní půdy diabasovou moučkou v polesí Choltice. [Improvement of a degraded forest soil in the Choltice forest range by means of diabase meal.]** *Sborn. čsl. Akad. zeměd.* 25 (1/2), 1952 (55–64). 5 refs. [Cz.cz.russ.e.] C.G.B.

Results are presented of experiments conducted in a forest area near Choltice (Czechoslovakia), where Pine stands and plantations growing on an acid, part sandy, part loamy soil, showed poor growth, apparently because of the lack of mineral nutrients (Ca, Mg, K, P) in the upper soil layers. Powdered diabase rock from a near-by quarry was strewn in a layer 1–2 cm. thick over the whole area. This has had a very favourable effect on plantation growth, particularly of *Quercus borealis* and *Tilia cordata*, during the first 2 years after application. The effect on isolated plants has been less favourable.

3826. AFANASIJEV, D. Ekspresne šume. **[Establishment of] fast-growing stands.]** *Šum. List* 75 (12), 1951 (387–92). [Croat.g.]

A brief account of experiments made by a group of Jugoslavian foresters and the Forest Experiment Station near Sarajevo. From 1940 certain compounds of trace elements, e.g. B, Mn etc. with nitrate N, and P_2O_5 were used to stimulate growth, with the following results: (1) a 3·20 m. high Oak seedling in 3 months from sowing; (2) an annual height increment of 1·30 m. for a 2-year-old *Picea abies*, and of 1·60 m. for a 7-year-old *Fraxinus excelsior*; (3) a *Sequoia gigantea* given trace elements only once, at planting in 1940, was in 1950 a tree 10 m. high and 33 cm. d.b.h., and had begun to bear cones. These stands were cut during the war, and the paper on them, which should have appeared in 1941, was lost. A detailed communication will be published shortly.

3827. RIGAUD, A. **Un biologiste poitevin obtient grace aux bactéries des rendements records. [A Poitevin biologist obtains record crops, thanks to bacteria.]** *For. France* No. 36, 1952 (11). [F.] X.

A brief account of the experiments of M. Coanda of Auxances near Poitiers. His method (the subject of several patents) consists in: (1) soil analysis to determine nutrient deficiencies; (2) preparation of a culture of bacteria designed to remedy these deficiencies; (3) injection of the culture into the root zone of the trees; (4) repetition of the treatment in the second and third years. Poplars [*'Populus niger'*] planted at 3·2-m. spacing on an unfavourable soil (dry and calcareous) and given the treatment, measured 27·2 cm. mean g.b.h. and 8·5 m. mean height at 4 years old, compared with 16·3 cm. and 5·5 m. for controls. Yields of maize, wheat, and fruit were increased 5–8 times by treatment.

The bacteria are cultured in the laboratory, mixed in a silica gel, and stored in the dark. They are mixed according to the needs of the soil to be treated (i.e. for nitrification, ammonification, fermentation etc.), with 'biotic factors' (offal from abattoirs, green manure, farmyard manure, flour etc.) prepared in a patented machine.

238. *Timber Plantation Crops requiring Special Treatment*

3828. MAISENHELDER, L. C. **Planting and growing Cottonwood on bottomlands.** *Bull. Miss. agric. Exp. Sta.* No. 485, 1951. pp. 23.

Supersedes an earlier bulletin [cf. *For. Abstr.* 6 (22)], and gives information on nursery practice, planting, tending, protection, and costs of establishing plantations of *Populus deltoides* on floodlands of the great Southern rivers.

24. TENDING OF STANDS AND TREES

See also No. 3828.

241. *Cleanings*

3829. HABLÜTZEL, H. Zur Organisation der Säuberungen in Buchendickungen. [**The organization of cleanings in Beech at the thicket stage.**] *Schweiz. Z. Forstw.* 103 (3), 1952 (84–97). 3 refs. [G.g.f.]

Notes on the timing of operations, organization of work teams, expenditure of time and costs.

242. *Thinnings*

See also Nos. 3577, 3824, 4381, 4442.

3830. EVANS, J. D. D. **Thoughts on thinning.** *Quart. J. For.* 46 (2), 1952 (92–6).

Practical notes on marking, designed to reduce fatigue. The advantages of marking the trees intended to form the final crops are also considered.

3831. SINGH, P. **Topsy-turvy thinnings.** *Indian For.* 78 (3), 1952 (138–43).

The author works out the application of his proposed method of thinning by tree classes [cf. *For. Abstr.* 10 (No. 2585)] on a sample plot of 70-year-old *Cedrus deodara*.

3832. SAGREIYA, K. P. **Single stem silviculture.** *Indian For.* 78 (4), 1952 (199–205).

Replies to criticisms evoked by the author's articles advocating a method of thinning irregular crops of Teak. [Cf. *For. Abstr.* 10 (No. 2585).]

3833. CARBONNIER, C. Gallringsintervallet. [**The interval between thinnings.**] *Skogen* 39 (1*), 1952 (6*–10*). [Sw.]

Reviews theories held in Scandinavia during the last 20 years, considers the improvement in timber quality as a result of frequent thinnings, gives the average interval for different parts of Sweden (ranging from 25–30 years in the north to 9 years in the south), and discusses other factors (e.g. transport facilities, age of stand and species) that determine the interval.

3834. HENRIKSEN, H. A. Et udhugningsforsøg i Sitkagran. [**A thinning experiment in Sitka Spruce.**] *Forstl. Forsøgsv. Danm.* 20 (5), 1951 (403–18). [Dan.g.]

Thinning experiments were begun in 1935 on Spruce planted on dunes between 1905 and 1912. Results for four thinning grades are tabulated showing (1) the number of stems, average height and diameter, b.a. and volume; (2) the annual volume and b.a. increment at 2-year intervals over 16 years; (3) the 1951 volume/ha. by diameter classes; and (4) average stem form in 1951. An attack by *Hylesinus micans* in 1949–51 appeared to be related to the thinning grade, being severe in the two heaviest grades and slight in the unthinned or lightly thinned plots.

3835. CHAPPUIS, J. B. Quelques aspects de la foresterie danoise. [**Some aspects of Danish forestry.**] *Schweiz. Z. Forstw.* 103 (3), 1952 (73–84). 7 refs. [F.g.]

In addition to a general account of forestry in Denmark, gives comparative data on the effects of thinning Beech at different ages and intensities in Denmark and in Switzerland.

3836. LØVENGREEN, J. A. Udhugning i bøg i Danmark siden 1900, statistisk belyst og teoretisk bedømt. [**Thinning of Beech in Denmark since 1900, illustrated statistically and assessed theoretically.**] *Forstl. Forsøgsv. Danm.* 20 (4), 1951 (271–354). 4 refs. [Dan.dan.e.]

The main points of the investigation are: the range and distribution of diameters within the average basal area at different ages and in different quality classes; diameter increment within the stand for different thinning grades; and the influence of the thinning grade on increment and yield. Results are given in graphs and tables with Danish and English legends; there is a full English summary.

3837. HENRIKSEN, H. A. Bemærkninger til udhugningsforsøget i bøg i Århus kommunes skove. [**Observations on thinning experiments in Beech in the Århus municipal forests.**] *Forstl. Forsøgsv. Danm.* 20 (5), 1951 (373–86). [Dan.f.]

Discusses further observations on a thinning experiment carried out between 1925 and 1942 [see *For. Abstr.* 7 (No. 1784)]. Results, which are tabulated, show very little difference in increment between the thinned and unthinned plots. It is felt, however, that the plots were too unlike at the beginning of the experiment for the results to have much value.

3838. HENRIKSEN, H. A. Et udhugningsforsøg i ung bøg. [**A thinning experiment in young Beech.**] *Forstl. Forsøgsv. Danm.* 20 (5), 1951 (387–401). [Dan.g.]

A thinning experiment was begun in 19-year-old Beech in 1938, using six thinning grades: A (unthinned), B and C (light and moderate thinning), D (heavy thinning) and E and F (two grades of very heavy thinning). Results of measurements in the stand and of stem analysis of sample trees are given in graphs and tables. After 13 years there is little difference in volume increment between plots A, B and C; D is doubtful; and E and F have dropped behind. Height increment does not appear to be stimulated by increasing the intensity of thinning.

3839. HEINSELMANN, M. L. **Labor costs for thinning young Aspen.** *Tech. Note Lake St. For. Exp. Sta.* No. 374, 1952. pp. 1.

Results of thinning two stands, one at 11 and the other at 20 years, showed that costs are much lower for the early thinning, even at compound interest. Later thinnings involve heavy axe-work.

243. *Opening of the Canopy (Increment, Overhead Release and Improvement Fellings)*

See also Nos. 3819, 3960 *et seq.*, 4072.

3840. SMITH, L. F. **Growth of residual Longleaf Pine in Southern Mississippi.** *J. For.* 50 (2), 1952 (132–3). 2 refs.

Analysis of 50 stems of Longleaf Pine, left standing after clear felling in 1902–3 as being too small and suppressed to be worth taking, confirmed previous findings that residual Longleaf may be expected to recover after release. [Cf. *For. Abstr.* 2 (216).]

245. *Tending of Trees, Pruning etc.*

See also No. 3993.

3841. **Bud pruning [of *Pinus pinaster* and *P. radiata*].** *Rep. For. Timb. Bur. Aust. 1950* [1951] (18).

Experiments have shown that the method is unsatisfactory for these species. It has the following disadvantages:—Epicormic shoots develop on the pruned zone of the stem; the branches left at the base develop strongly, become expensive to remove, impede movement in the plantations and make fire protection more difficult; the whorls immediately above the pruned zone develop large branches which tend to grow at an acute angle; bends are prevalent in the pruned zone; and the method is not cheap.

3842. COOK, D. B. **The Meylan pruning saw.** *J. For.* 50 (2), 1952 (133–4).

The saw consists of a pole-saw head with a 16-in. 8-point curved blade mounted on a single-bit axe handle. The weight is only 2 lb., and total length 46 in. Its advantages in use are described. Assembling of saw and handle is simple and easy.

3843. MARSDEN, D. H. **Are wound paints Trojan horses?** *Trees, Cleveland, Ohio* 12 (3), 1952 (9). 5 refs.

The Shade Tree Laboratories, University of Massachusetts, have tested several types of wound paint for toxicity to spores of *Ceratostomella ulmi*. It was found that spores could survive immersion for at least one day in white-lead paint, a penetrating wood-sealer compound, and one typical proprietary tree paint; at least 5 days in both spar varnish and another of the tree paints tested; and at least 11 days in either asphaltum or two other proprietary tree paints. Spores failed to germinate after contact for one day with shellac, with Bordeaux paint (Bordeaux powder freshly stirred into raw linseed oil), with a pre-vulcanized natural latex compound, or with two of the proprietary wound paints tested. [Cf. *For. Abstr.* 6 (p. 258).]

26. FORESTRY IN AGRICULTURAL AND PASTORAL AREAS (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

See also No. 3719.

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

See also Nos. 3568, 4459.

3844. GOOR, C. P. VAN, OOSTEN SLINGELAND, J. F. VAN, and VEEN, B. **Landbouwvoorbouw als middel tot verbetering van de groeiplaats. [Agricultural crops as a means of improving [forest] sites.]** *Ned. Boschb.-Tijdschr.* 24 (5), 1952 (113–25). 10 refs. [Du.e.]

Erdtmann's method of improving degraded fine sands on preglacial podzolized soils by silvicultural means is discussed and compared with Hessenkamp's method based on mixing the raw humus with the upper soil layer, manuring with Ca, P, and N, and growing agricultural crops for a few years to offset the costs of cultivation and manuring [cf. *For. Abstr.* 3 (pp. 21–2); 13 (No. 2142)]. The chemical basis of these theories is discussed. In the Netherlands, where soils are rather coarser, if the humus content is adequate but the accumulation of raw humus has begun, the addition of a small amount of Ca and suitable silvicultural measures (e.g. thinning and underplanting) without soil cultivation will suffice; if there is insufficient humus in the A_1 horizon and the soil is covered with a deep layer of raw humus, the addition of large quantities of Ca to the humus, mixing this with the upper soil, and manuring with P and N will be necessary; the high cost can be offset by planting agricultural crops for a few years. After cropping and one year of green manuring, complete soil cover should be established to stimulate litter production. Tree species giving litter of good composition should be chosen.

265. *Strips or Lines at Road, Rail and Canal Sides etc.; Hedgerow Trees*

3845. JOSHI, D. P. **Roadside avenue plantation technique as practised in Southern Doab Division, Etawah [, U.P.].** *Indian For.* 78 (3), 1952 (153–7).

3846. JOACHIM, H. F. Pappelanbau ausserhalb des Waldes. **[Growing Poplar outside the forest.]** *Dtsch. Landwirtsch.* 3 (4), 1952 (213–20). 11 refs. [G.]

The following types of site outside the forest can be used with advantage for growing Poplar: (1) The banks of ditches, canals or watercourses. Here, as witnessed by examples from Spreewald, the trees should be closely planted, and small-crowned. A decline in increment and a susceptibility to windthrow after the age of 25 years are attributed to the formation of shallow root systems, due to the high watertable, and can be avoided by working on a 25-year rotation. (2) Pasture land. On good soil, where the watertable is not too high, small-crowned Poplars are worth growing. They will not thrive on drained land. (3) Field margins. Valuable timber can be obtained from such stands, which may also form useful windbreaks. Crops are definitely affected, however, by the root systems, which often extend 25 m. into the field, but the disadvantages can be overcome by applying extra fertilizer to the affected areas, by separating the trees from the field by ditches, or by using small-crowned species with few surface roots.

266. *Shelterbelts, Windbreaks*

See also Nos. 3858–9.

3847. ERNESTO ALONZO, A. **Provisión de madera para envases—cultivo del álamo en Río Negro. [Supplying timber for packing cases—the cultivation of Poplar in the Río Negro Territory.]** *Alm. Minist. Agric. Argent.* 26/27, 1951–52 (169–74). [Span.] A.P.B.

The fruit industry of the Río Negro valley (Argentina) requires 12 million packing cases annually, for which at present Paraná Pine is imported. The Administración Nacional de Bosques estimates that if 800 ha. were planted annually with Poplar this demand could be met locally. Windbreaks are common in this region, *Populus nigra* var. *italica* and *P. nigra* var. *sempervirens* being the preferred species. They are usually put in double rows, running north to south, the rows about 1·5 m. apart with an irrigation ditch between them and individual trees at 1-m. intervals. The space between such shelterbelts (about 6–8 m. wide) is frequently sown with alfalfa. Such a plantation contains about 2,200–2,400 trees per ha. A felling cycle of about 12 years would be advisable in such a plantation, if established primarily for timber production. If planted specifically as a windbreak, it would better be felled at maturity (ca. 20 years), in which case a double row may produce more than 50 cu.m. per 100 m. length.

3848. **Shelterbelts for farmland.** *Fixed Equipment of the Farm Leaflet, Ministry of Agriculture, London* No. 15, 1951. pp. 12 + 5 photos. H.M. Stationery Office, London. Price 9*d*.

Summary information on the purpose, effects, location, establishment and care of shelterbelts, and on grants and tax allowances.

3849. Mařan, B., Lhota, O., and Uhliř, P. Vliv ochranných lesních pásů na vlhkost fysiologického prostoru půdy. **[Influence of shelterbelts on soil moisture.]** *Sborn. čsl. Akad. zeměd.* 23 (1/2), 1950 (23–46). 51 refs. [Cz.russ.e.] C.G.B.

The effect of shelterbelts on meteorological factors and on the moisture of the soil was studied for 3 different types of shelterbelt in the dry regions of Bohemia, having a mean annual temperature of 8·4–8·8° C., and ca. 500 mm. annual rainfall. (1) At Obřistvi, altitude 160 m., a belt consisting of even-aged *Pinus nigra* var. *austriaca* without any admixture or undergrowth; length 123–130, width 30–35, height 6 m. At depths of 0–60 cm. soil moisture was lowest under the tree crowns and on the shelterbelt edges. (2) At Vinoř (near Prague), altitude 250 m., a system of windbreaks formed by double rows of Chestnut (12–14 m. apart) with an undergrowth of Woodbine, Privet, Hawthorn, and Elder (2–4 m.). The soil under both trees and shrubs was found to be drier than outside. Only at 0–10 cm. depth, under mixed hardwood stands with undergrowth, on dry sites, was the moisture slightly higher than outside. Soil moisture between windbreaks was, other things being equal, higher than in the open. (3) At Písty, on flooded meadowland, with scanty precipitation and relatively high temperatures, in a shelterbelt 20·5 m. high, 60–75 m. wide, and 100 m. long, consisting of Ash and Alder with undergrowth and dense ground vegetation, and 2 rows of low, bushy Willows parallel to the main belt. Contrary to expectation, the soil under the shelterbelt trees was not drier than in adjacent open ground and the soil between the shelterbelt and the forest 200–300 m. distant was much moister than in exposed positions.

3850. Lhota, O., Uhliř, P., and Mařan, B. Vliv ochranných lesních pásů na mikroklima chraňeného prostoru. **[Influence of shelterbelts on the microclimate of the protected area.]** *Sborn. čsl. Akad. zeměd.* 24 (1/2), 1951 (29–49). 52 refs. [Cz.russ.e.] C.G.B.

Further studies of the 3 shelterbelts referred to in the preceding abstract. The Obřistvi shelterbelt is permeable only in its lower part. Its effect on wind velocity (of the prevalent NE wind blowing nearly at right angles to the belt) and rate of evaporation, is noticeable to a distance equal to 18–20 times its height. Its size is insufficient to afford adequate protection by influencing the microclimate, particularly because of the frequent changes in direction of the wind. The windbreak system at Vinoř is of a type intermediate between wholly impermeable and evenly permeable. The wind velocity to leeward falls to 20–25% of the full velocity, and then rises gradually to 65–85% of the initial velocity. The interspaces between the rows and belts have a microclimate differing from that obtaining in forest conditions. The Písty shelterbelt being situated along a valley bottom, its effect is added to that of topography.

3851. Mařan, B., Lhota, O., and Uhliř, P. Vliv ochranných lesních pásů na vlhkost půdy ve Vinoří. **[Effect of shelterbelts on soil moisture at Vinoř.]** *Sborn. čsl. Akad. zeměd.* 24 (3/4), 1951 (189–215). 53 refs. [Cz.cz.russ.e.] C.G.B.

Soil moisture and texture were studied by the Kopecky method in 14 experimental plots of the Vinoř shelterbelt area. In the uppermost layer (0·5 cm. depth) the soil in the open field was moister than within the belt but drier than soil in the forest. In the next layer (5–10 cm.), drier soil was found on the windward side of the first windbreak in dry weather. On the leeward side, the favourable moisture effect of shelterbelts was noticeable at a distance of 20 times their height. During the growing season, the protective influence of shelterbelts was noticeable in still deeper layers (10–20, and 20–40 cm.). In all cases, soil moisture was at a minimum under the crowns of the shelterbelt and in forest with a bushy undergrowth, and at a maximum to the lee of the belt.

3852. Iizuka, H., Tamate, S., Takakuwa, T., and Sato, T. **Experiments with model windbreaks (1st report). Effect on salt-laden wind.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 45, 1950 (1–15). [Jap.e.]

Results of an investigation on the protection offered by seaside forest against salt particles blown from the sea. The experiments were conducted on (*a*) two model windbreaks (*Pinus thunbergii*, height (*h*) 1·5 m., width 15 and 4 m., respectively) and (*b*) with a real stand *h* 12 m., width 204 m. In terms of weight carried by wind in unit time, the amount of NaCl at a distance of 2 *h* to leeward from (*b*) was 2%, and at a distance of *h* and 3 *h* to leeward of (*a*) 5 and 18%, respectively, of the amount to windward. The effective distance (i.e. that at which the amount of NaCl behind the windbreak equals that in an open field) is ca. 25–30 *h* for both (*a*) and (*b*).

3853. IIZUKA, H. **Wind erosion prevention by windbreak.** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 45, 1950 (95–129 + 4 photos). [Jap.e.]

Field experiments using a specially designed soil-catcher (described) show that a windbreak which reduced velocities to 61·44, 69·33, and 77·44% of that in the open, at leeward distances of 10 *h*, 20 *h*, and 30 *h* [*h* = height of windbreak], respectively, decreases the soil-blowing effect to 0·14, 18·04, and 50·54% respectively, of that in the open. Results are given in tables and graphs.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See also Nos. 3582, 3642, 3713, 3961 *et seq.*

3854. HOPKINS, W. **Grazing in the cut-over Longleaf Pine region.** *J. For.* 50 (5), 1952 (384–6).

Cattle, unlike pigs, sheep and goats, do comparatively little damage to Pine regeneration, which they graze only in winter. Examination of grazed Longleaf Pine reproduction showed a reduction in growth but no increase in mortality.

3855. RAGONESE, A. E., and CASTIGLIONI, J. A. Sobre una experiencia para recuperar la receptividad ganadera de los bosques naturales de Formosa. [**An experiment in restoring pasturage in the natural forests of Formosa, [El Chaco, Argentina].**] *Idia* 4 (48), 1951 (4–5). [Span.] C.G.B.

An area of about 17 ha. in xerophilous (mainly *Schinopsis lorentzii* and *Bulnesia sarmientoi*) forest was fenced off to protect it from grazing, particularly from goats. A wire fence of 5 strands was used, reinforced by a live cactus hedge of *Cereus coryne*. After 2 years, whereas in adjoining, unprotected areas only some Cactaceae, Bromeliaceae and a few shrubs remained, in the fenced-in area a vigorous regeneration had taken place, both of grasses and of tree species.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also Nos. 3845, 3852, 3950–1.

3856. U SU. **Government Botanical Garden, Maymyo.** *Burmese For.* 1 (2), 1951 (72–7).

Notes on history and present condition.

3857. SPITTA, M. **A quarter of a century of highway planting. The work of the Roads Beautifying Association.** *J. R. hort. Soc.* 77 (1), 1952 (4–12 + 7 plates). O.B.D.

A review of the history of the Association and of its work in Great Britain since its foundation in 1928.

3858. **Farm and estate hedges.** *Fixed Equipment of the Farm Leaflet, Ministry of Agriculture, London* No. 11, 1951. pp. 14 + 7 photos. H.M. Stationery Office, London. Price 1*s.*

Summary information on choice of species, establishment, and maintenance.

3859. LE SUEUR, A. D. C. **Hedges, shelterbelts and screens.** Country Life Ltd., London. 1951. pp. 128 + 28 plates. Price 15*s.*

Contains chapters on ornamental and agricultural hedges, farm shelterbelts, coastal screens, and the law in regard to hedges and trees, all in Great Britain.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 89.

282. *Bark Crops*

See Nos. 4405–6.

284. *Crops Tapped for Exudations*

See also Nos. 4422 *et seq.*

3860. ISHAQ, S. M. **Production of rosin and turpentine in Pakistan.** *Pakistan J. For.* 2 (1), 1952 (50–2 + 1 photo).

A note on methods employed to tap *Pinus longifolia* and to process the resin.

3861. KLOOT, W. G. VAN DER. De winning van balsem uit *Pinus merkusii* en de verwerking tot hars en terpentijn. [**Resin tapping of *P. merkusii* and the production of turpentine.**] *Tectona* 41 (3/4), 1951 (1952), (259–85). 11 refs. [Du.e.jav.]

Describes the methods employed in Indonesia for tapping *P. merkusii*. Experience has shown that resin flow is directly correlated with width of tree spacing and tree vigour. The French type of face is used, with freshening every 3 days. The minimum d.b.h. for profitable working is 17–18 cm.; the usual interspace is 8–12 cm. American and French distillation methods are described.

3862. MIROV, N. T., and KIMBROUGH, E. F. **Sulfuric acid increases yield of gum in Ponderosa Pine.** *J. For.* 50 (2), 1952 (132).

A pilot experiment on 4 trees with twin faces separated by 8 in. of bark, one face being a control; 40% H_2SO_4. Average resin yield per streak was 4·4 oz. from treated and 3·2 oz. from untreated faces, from May to August.

3863. SNOW, A. G., JR. **Gum yields with different frequencies of chipping and treatment.** *Res. Notes Stheast. For. Exp. Sta.* No. 5, 1952. pp. 2.

Yields for one season from Slash and Longleaf Pines, tapped at intervals of 2, 3 or 4 weeks and treated with acid, are shown in graphs. The optimum interval is one of 2–3 weeks when acid is used.

3864. KEKUH, A. M. Dvadcatj pjatj let podsočno-terpentinnoĭ promyšlennosti SSSR. [**Twenty-five years of the resin-tapping and turpentine industry of the U.S.S.R.**] *Priroda, Moskva* 40 (11), 1951 (75–80). 8 refs. [Russ.] A.P.B.

A brief historical review of the development of this industry from its first beginnings near Kiev in 1920–22, and the first tapping on an industrial scale in 1925, up to 1950—a period during which the U.S.S.R. changed from a resin-importing to an exporting country with the third largest production in the world. Mentions [without adequate description] some recent methods of increasing resin yield, e.g. using two faces one above the other, which are alternately worked for 3 freshenings at a time, the cup being shifted as required; or using faces on both the upper and lower parts of the stem, giving the upper face 3 and the lower 1 freshening per week up to 15 July and then intensifying the freshenings on the lower face and decreasing them on the upper for the rest of the season.

3865. Besser, A. A., and Snickiĭ, V. P. O dliteljnoĭ podsočke sosny obyknovennoĭ. [Protracted tapping of Scots Pine.] *Lesn. Prom.* 1950 (6), (19–21). [Russ.]

Unlike *Pinus pinaster* in France, *P. sylvestris* in the U.S.S.R. is unsuited to protracted (25–30 years) resin tapping. The alleged greater yield is shown to be unfounded; the labour costs are higher than for short-term tapping, and the stems are disfigured. Results of several investigations are discussed, and it is concluded that, in most parts of the U.S.S.R. (particularly Siberia), heavy tapping should be done (faces covering 80% of the girth) for some 15 years with a 1-year rest after the first 10 years.

3866. Grochowski, W. . . Charakterystyka wycieku żywicy sosnowej. [Characteristics of the flow of Pine resin.] *Prace Inst. Bad. Leśn.* No. 72, 1951. pp. 152 + 3 tbls. 49 refs. [Pol.russ.e.]

A quantitative analysis of results obtained in experimental tapping areas in 1937–9 and 1947–8. The test stems were divided into groups, each of which contained a large and identical number of trees and had the same representation of diameter classes; in each replication, the number and allocation of faces were identical; and trees belonging to each group were taken from all over the experimental area. All groups were handled for the whole tapping period by the same worker, using the same tools. The following results were obtained: (1) The ability to secrete resin varies from one tree to another and also with time; but when the tapping period is very long or the population very large, this evens out to a more or less constant figure; the simplest and most convenient criterion of yield within the limits of a stand is d.b.h.; the best criterion is the total or average resin yield from a few freshenings, or the initial efflux. (2) The effect of orientation of face on the yield is elusive. (3) There is no interdependence between the yields of two faces on the same stem. (4) The rate of flow depends on the area from which resin can flow to the face; this is restricted because the movement of resin in the tissue between two adjacent (streak) freshenings is insignificant; a pause in the freshenings usually increases the yield from subsequent freshenings; details of the effect of pauses of varying duration on the yield, and of the 'fatigue' of the resin-secreting apparatus are given. (5) Wider spaces between the streaks increase the yield; but with wider streaks and a given interspace the rate of yield increase diminishes. (6) It is not necessary to leave any space between freshenings in the case of ascending streaks. (7) The re-freshening of streaks is useless. (8) Several methods of raising both the resin yield and the labour output are described, including (*a*) an ascending and a descending face on the same stem, (*b*) a face freshened simultaneously at both ends, i.e. both ascending and descending (modification of Radwan's pre-war experiments; a great saving of labour but not conclusively more productive), (*c*) reduction of the width of the streak below 8 mm.

3867. Browne, F. G. Yield of latex from small *Alstonia* trees. *Malay. Forester* 15 (1), 1952 (31–2).

Interest has been aroused in the possibility of growing *Alstonia* spp. in plantations and tapping them in the same way as *Hevea*, to obtain latex. Their growth is believed to be fairly rapid, they coppice freely, are probably tolerant of poor soil conditions, and can compete with fast-growing weeds. Seed is difficult to collect, but germination % is high. As a small preliminary experiment 54 trees, including two species (*A. angustiloba* and *A. spathulata*) and varying in girth from 16 to 36 in., were tapped for three consecutive days. The results (tabulated) suggest that yield increases with girth. There was no discernible difference in yield between the two species or between trees growing on swamp and on dry soils.

Two samples of latex, mixtures of both species, were coagulated with salt, the first by boiling, the second by standing, and yielded respectively 4·4 and 4·7 lb./gal. Yields of latex from these trees growing in wild conditions were not high, but could no doubt be much increased in plantations by breeding, the use of fertilizers etc.

3. HARVESTING OF WOOD, LOGGING AND TRANSPORT. RATIONALIZATION OF WORK; WORK STUDIES. FOREST ENGINEERING

31. LOGGING AND TRANSPORT: GENERAL

See also Nos. 4134, 4145, 4161.

3868. **American forest operations and tropical timber production.** Organisation for European Economic Co-operation, Paris. 1951. pp. 88 + 47 photos. 13 refs.

Report of a visit by experts (Technical Assistance Mission No. 18A) to study methods of logging, transport, and conversion in the subtropical parts of the U.S.A. [Cf. *For. Abstr.* 13 (No. 3723).]

32. FELLING AND RELATED OPERATIONS

321. *Marking*

See also No. 3830.

3869. DEGRACE, L. A., ROBINSON, E. W., and SMITH, J. H. G. **Marking of Spruce in the Fort George Forest district.** *Res. Notes B.C. For. Serv.* No. 20, 1952. pp. 13. 6 refs.

Recommends a marking rule to overcome the disadvantages of cutting to a diameter limit, and describes a marking technique based on experience in the Fort George Forest District. Notes are given on equipment and current costs.

322. *Preparatory Measures*

See also Nos. 3964, 4192.

3870. DEMOISY, R. G. **Progress report on chemical debarking.** *Circ. Inst. For. Prod., Wash.* No. 19, 1952. pp. 4.

Several methods of girdling the trees and applying Na_2HAsO_3 solution for barking pulpwood species have been tested. Western Hemlock, Firs, Black Cottonwood and Western Red Cedar have been successfully treated. Results for Douglas Fir are disappointing. Bark separation tests with Red Alder are incomplete, but no separation had occurred after 160 days. Future plans are discussed, and additional information is given on crew organization and treating techniques, safety precautions and patent rights.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 3556, 3879–87.

3871. Puutavaran hankinnan koneista ja välineistä. **[Machinery and equipment for logging.]** *Metsät. Aikak.* 1951 (10), (245–8). [Fi.e.] (*Metsätehon Tiedoituksia* No. 67.)

Describes, with illustrations, the 'Comet' and 'Jo-Bu' lightweight motor saws [cf. *For. Abstr.* 11 (No. 378)], the 'Joutsa' boom crane, the 'Dieselstier' and 'Volvo T 31' tractors, and the 'Livab' trailer.

3872. En lättviktare—men en stark sak. **[Light but strong [the Comet motor saw].]** *Skogsägaren* 27 (3), 1952 (70–1). [Sw.]

This saw, designed by a Norwegian, is being manufactured by 'Comos', Artillerigatan, Stockholm. Production during 1952 is expected to include some saws for export. Weighing 8 kg., the saw is of the semi-diesel type and is primed by propane gas stored in a tank in the handle which contains enough for 150 starts. Oil mixed with kerosene, solar oil or petrol is used as fuel.

3873. PABLO. **En motorsåg i lättvikt. [A lightweight motor saw.]** *Skogen* 38 (1), 1951 (8). [Sw.]

A further description, with photographs, of the Comet saw. [Cf. preceding abstract.]

3874. PARFENOV, G. M. **Vintovoĭ domkrat dlja valki derevjev. [Screw jack for tree felling.]** *Lesn. Prom.* 1950 (9), (14–5). [Russ.]

An illustrated description of a screwjack 4 m. long (when closed) and weighing 11–15 kg., for tilting trees in the required direction during felling with a saw. The screwjack is placed at an angle of 45°, its lower end being firmly fixed to the ground by means of a base-plate with prongs, while the sharp hooked upper end is driven into the tree.

3875. DOUDA, V. **Zkušebni prototypy přenosných mechanických odvětvovaček a odkorňovaček. [Experimental prototypes of transportable mechanical trimmers and barkers.]** *Lesn. Práce* 31 (2), 1952 (80–7). [Cz.]

An illustrated description of power-driven tools developed in 1946–50 in the Czechoslovak Forest Products Research Institute at Zbraslav II.

(1) A chain-saw trimmer which cuts branches up to 120 mm. thick, weighs 5·1 kg., and is driven by a single or double-cylinder 2-stroke internal-combustion engine carried on the worker's back. The engine weighs ca. 20 kg. (2) A circular-saw trimmer with a blade of 300 mm. diam. driven by a 1 h.p. asynchronous electric motor attaining a speed of 16,800 revs./min. and causing no unpleasant vibration. The total weight (including motor) is 12 kg., or 8 kg. if made from lighter alloys.

The barkers are of the impact-vibration type; the first two are powered by either of the motors mentioned before. (3) The LK barker weighs 6·4 kg., has a stroke of 40 mm., and a frequency of 1,500/min. (4) An improved model, the LK1, weighs 7·6 kg., the stroke and frequency being 20 mm. and 800/min., respectively. (5) A self-contained electrically driven barker weighs 8·9 kg., has a stroke of 20 mm. and a frequency of 500/min. (6) The latest tool was designed in 1950 on the principle of the magnetic hammer; it weighs 10·7 kg. [stroke and frequency not given] and has so far yielded the best results.

3876. LIDÉN, S.-Å. **Barknings-problemet løst? [The barking problem solved?]** *Skogsägaren* 27 (11), 1951, (229–30). [Sw.]

The machine, which has rubber tyres, is easily moved and weighs 2,000 kg., is manufactured by Oskar Skoglund of Arbrå. The timber to be

barked is lifted by hoist to the first feed equipment, two vertical plates that can be moved sideways, with the convex sides towards each other; here there is a regulator automatically adapting the feed speed to the time needed for barking in each diameter class. Next the log passes through the centre of a ring-like rotating disc having the barking tools mounted in its periphery. These have counterweights which are forced outwards by centrifugal force when the disc rotates, pressing the blunt tool ends in towards the log, which is barked without damage to the wood. The machine is driven by a 12–13 h.p. electric motor. So far, the full capacity of the machine has not been tested because of a lack of a continuous flow of wood, and the maximum per hr. (360 10½-in. pulpwood billets, corresponding to 700 cu. ft.) is not representative. A smaller machine for 3-m. charcoal wood is planned; its capacity is estimated at 200 cu.m. per day, and its weight at 1,200 kg.

3877. FORES, E. W. **Improved harvesting methods. Equipment survey notes. Mobile drum bark peeler.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–44, 1951. pp. 1. P.R.

Brief illustrated description of a dual-purpose machine that barks pulpwood in transit. A lorry-mounted drum contains a rotating axle bearing 5 compartments, in which the wood rotates against lugs or steel brushes. It can bark up to 23 cords in 8 hours.

3878. MORLEY, P. M. **Further experiments with splitting guns.** *Pulp Paper Mag. Can.* 53 (4), 1952 (140–1).

A modified gun gave easier penetration into frozen wood and could be used by one man. Lugs have been welded on the side, and 2-ft. lengths of ½-in. chain are attached so that the gun can be dogged on to the bolt to be split, and no recoil block is needed. There are 4 protruding pins at the front of the gun, to cause heavier penetration and to allow splitting even if contact cannot be established between the gun itself and the bolt. In one test run, cost of labour and materials was $2·23 per cord. The new gun is shown in photographs. [Cf. *For. Abstr.* 12 (No. 2078).]

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE

See Nos. 3733, 3886, 3958.

34. STORAGE IN THE FOREST AND AT LOG DUMPS

See Nos. 4345, 4350–1, 4362.

35. RATIONALIZATION OF WORK. WORK STUDIES

See also No. 3829.

3879. MIYOSHI, S., and OGATA, Y. **The management of natural forests of Shii (*Shiia*) and Kashi (*Cyclobalanopsis*) in Miyazaki. The felling and transport of Shii and Tabu. (1).** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (59–61). [Jap.e.]

Work studies showed that the times needed for felling, trimming, cross-cutting and barking Shii and Tabu [*Machilus thunbergii*] are similar to those for Kuromatsu [*Pinus thunbergii*]. Their higher sp. gr. means, however, that a cartload of these species is equal only to 72% of the volume of a cartload of Kuromatsu. Both species are considered exploitable for pulpwood.

3880. ULLÉN, G. **Några skogliga arbetsstudier. [Some forest work studies.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (3), (304–32). [Sw.]

Reports on the second part of an investigation [cf. *For. Abstr.* 11 (No. 2841)]. Results of cross-cutting 151 Spruce and 47 Pine-ranging in diameter from 5 to 43 cm. o.b. show an increase in cross-cutting time with diameter; it rises proportionately to the diameter from 5 to 8 cm., proportionately to the cube of the diameter from 18 to 26 cm., and again proportionately to the diameter, but more steeply, above 26 cm. For diameters of 15 cm. o.b. the average time for Spruce is 0·59 ± 0·024, for Pine 0·71 ± 0·035 min., and for Birch (figures obtained before the present investigation) 0·95 ± 0·05 min. Studies were also made on time per tree and time per piece for the various operations of felling and primary conversion, and results are given in graphs and tables. Felling and cross-cutting times increase with diameter, and the time for loosening hang-ups increases with stand density. Time for moving the cross-cut timber from stump to haulage road increases with diameter, and more rapidly with top diameters above 18 cm. o.b. Barking time increases with diameter and branchiness; time per piece for a constant length increases with diameter. On the basis of calculations of the effect of tree height and branchiness on the different operations in felling and primary conversion, recommendations are made for increased rates payable for work difficulty.

3881. SAMSET, I. **Hogstundersøkelser i norsk granskog. [Felling studies in Norwegian Spruce forest.]** *Medd. norske Skogforsoksv.* 10 (3) (No. 37), 1950 (398–595). 16 refs. [Nor.e.]

Time studies were made of work by 17 trained workers. Among the items studied were: the effect on the time taken in felling, trimming, barking, measuring for cross-cutting, and cross-cutting, of such factors as temperature, snow depth, stand density and tree dimensions; the pulse rates of workers during the different operations; the pulse rate, felling output and lost time of individual workers; and felling output using 5 different power saws. The results are shown in graphs and tables with English legends, and there is a full English summary.

3882. BLOKHUIS, J. L. W., and OOSTING, W. **Eenmansbeugelzaag en schilschop met drie snijvlakken. [A one-man bow saw and a barking spud with three cutting edges.]** *Ned. Boschb.-Tijdschr.* 24 (2), 1952 (29–32). [Du.]

Time studies were made on Norway Spruce, Larch, and Scots Pine with butt diameters 6–8, 8–10, 10–12 and 12–14 cm. Five trees in each diameter class were either: (1) felled with a 2-man saw and trimmed with an axe; or (2) felled with a 1-man saw and trimmed with a barking spud having a triangular blade, its front cutting edge suitable for barking and its two side edges for trimming. The bark was not

removed. Results in man-minutes are tabulated. Felling with the 1-man saw was quicker than with the 2-man saw except for Spruce and Larch, diam. 12–14 cm., when the times were equal; the difference between the times for the two saws decreased with increasing diameter. For trimming, the spud was quicker for all diameters of Larch and Spruce, but slower for the three larger diameters of Pine, which had thicker branches. The spud is considered safer than the axe. For the two operations together the 1-man saw and spud were quicker for Spruce and Larch of all diameters and for Pine 6–8 and 10–12 cm. in diam., while the times were equal for Pine 8–10 cm. in diam. and quicker for 2-man saw and axe for Pine 12–14 cm. in diam. In the total time for the 20 trees the time saved by using the 1-man saw and the spud was 30, 43·6 and 4% for Spruce, Larch and Pine respectively. Time per tree was longest for Spruce and shortest for Larch.

3883. KANTOLA, M., and GRANVIK, B.-A. En ny hugningsteknik. [A new logging technique.] *Skogsägaren* 27 (1), 1951 (15–21). [Sw.]

Describes, and illustrates with photographs, techniques of felling with a 1-man felling and 1-man bow saw, and of trimming, that are physiologically preferable, safer and more productive than usual techniques. [Cf. *For. Abstr.* 10 (No. 1946).]

3884. ILON, B. När lönar sig motorsågen? [When does a motor saw pay?] *Skogsägaren* 26 (6), 1950 (120–3). [Sw.]

Gives figures showing the saving that may be effected by using a 1-man motor saw in given conditions and discusses the organization of the work. The motor saw is most profitable for felling and cross-cutting fairly large trees with few branches.

3885. BUJNOVIĆ, M. Prilog poznavanju upotrebe motornih testera. (Tehnički zastoji kod obaranja). [The use of motor-driven saws. (Technical stoppages during tree felling).] *Šumarstvo* 4 (5), 1951 (295–302). 2 refs. [Serb.f.]

Presents results of time studies made in 1948 in south-western Srem (Sirmia) in mixed (70/30%) Oak/Hornbeam stands (average d.b.h. 54 cm., density 0·7), using the 'Rinco' motor saw weighing 38 kg. The stems were always prepared for felling by clearing round the tree. The felling, done entirely with the motor saw (3 horizontal cuts) took only 22·9%, walking from tree to tree 31·4%, and stoppages 45·7%, of the total time. Stoppages consisted of: starting the motor, 4·23; cooling it, 5·58; refuelling, 3·36; adjusting the chain, 0·36; changing chains, 2·26; lubricating the chain, 1·26; cleaning the ignition plugs, 2·90; worker's rest breaks, 3·73; jamming, 13·95; and chain breakage, 8·04%. The last two items are abnormal stoppages, which took ca. 22% of the total time.

3886. KALAŠNIKOV, P. L. Spilivanie derevjev zapodlico s zemleĭ i trelevka lesa. [Tree-felling with saw flush with the ground and skidding of logs.] *Lesn. Prom.* 1950 (9), (11–2 + 1 photo). [Russ.]

Experimental fellings with the CNIIMÈ-K5 electrically driven saw have shown that sawing flush with the ground, instead of the usual 10–20 cm. above: (1) took on the average 58% longer for trees over 15 cm. d.b.h. but no longer for smaller trees; (2) yielded an additional 5 cu.m./ha., equivalent to 3% more outturn, including ca. 2% of pulpwood; (3) shortened by 5–6% the duration of tractor or winch skidding.

3887. PUTKISTO, K. Vanerikoivujen kasaamisen aiheuttamasta vetovastuksesta. [The drag in piling veneer logs.] *Metsät. Aikak.* 1951 (10), (251–4). 5 refs. [Fi.e.]

Comparative drag measurements were made to determine the strain on a horse when piling veneer logs by shears, chain loop or front sledge. Resistance values are tabulated. The following conclusions are drawn: (1) None of the piling methods tested provided sufficient resistance to overstrain the horse during the short duration of the peak load, when logs were of normal size. (2) The best average results, as regards drag, were obtained with shears. (3) The greatest strain to the horse was caused by sudden stops; these were most frequent for sledge piling and least frequent for piling by shears. *From author's summary.*

37. TRANSPORT

372/377. *Land Transport*

See also Nos. 3556, 3583, 3871, 3879–80, 3886, 4069.

3888. SMYTHIES, B. E. Extraction by kuda-kuda in Sarawak. *Emp. For. Rev.* 31 (1), 1952 (42 + 4 photos).

Describes, with photographs, a method of skidding tree-length logs from freshwater swamps to rail by hauling on a sledge over rollers. A 7-man team is usual. The advantages of this method are enumerated. [Cf. *For. Abstr.* 13 (No. 359).]

3889. CARR, G. Tree length logging of pulpwood. *Pulp Paper Mag. Can.* 53 (3), 1952 (327).

Summary of a paper presented at the annual meeting of the American Pulpwood Association, February 1952, covering the handling of pulpwood in lengths exceeding the size that one man can handle alone from stump to landing.

3890. GUGALO, I. A., and BEREZIN, P. G. Vyvozka lesa v hlystah na avtomobiljah. [Lorry haulage of tree-length logs.] *Lesn. Prom.* 1950 (7), (9–10). [Russ.]

This type of haulage, introduced in a forest range of the Ustyugles 'Trust', raised skidding efficiency from 4·1 cu.m./man-day and 26·1 cu.m./winch-day to 6·9 and 38·4 cu.m. respectively.

3891. ČIKOV, JA. I., and PIIR, A. I. Vyvozka lesa v hlystah na avtomobiljah. [Lorry haulage of tree-length logs.] *Lesn. Prom.* 1950 (11), (13–5). [Russ.]

An illustrated description of the application of standard ZIS-21 lorries with semi-trailers to the hauling of tree-length logs. The distance between the stakes of the lorry and the semi-trailer is $\frac{1}{3}(A-3)$ m., where A is the average log length.

3892. ILJIN, B. A. Organizacija raboty nižnego sklada pri hlystovoĭ vyvozke lesa. [Organization of work at the timber depôt when timber is extracted as tree-lengths.] *Lesn. Prom.* 1950 (6), (5–8). [Russ.]

3893. Dolgopolov, N. P., and Petrov, P. E. Traktornaja trelevka hlystov s kronoï. [Tractor skidding of tree-lengths with crowns intact.] *Lesn. Prom.* 1950 (5), (13–4). [Russ.]

An illustrated description of experimental skidding of whole stems with crowns, using KT-12 tractors. The stand was predominantly Spruce, density 0·7, average height 18 m., average diameter 20 cm., carrying 180 cu.m./ha. The skidding trails were arranged at 350–400 m. intervals. The average man-day output was 4·3 cu.m., compared with 3·6 cu.m. for trimmed stems. [Cf. *For. Abstr.* 13 (p. 352).]

3894. Kreknin, V. V., and Lukjančikov, S. N. Elektrolebedki na trelevke hlystov s kronoï. [Electric winch skidding of tree-lengths with crowns intact.] *Lesn. Prom.* 1950 (5), (11–3). [Russ.]

Cf. *For. Abstr.* 13 (p. 352).

3895. Larionov, A. I. O novoï tehnologii lesozagotovok. [New logging technique.] *Lesn. Prom.* 1950 (8), (4–5). [Russ.]

Presents tabulated results of trials conducted in June 1949 in the Experimental Forest of the Siberian Institute of Forest Industry, to determine the resistance experienced when untrimmed trees are skidded butt forward by a skidding winch. The 80-m. trial run had a downward slope of 7·2% (angle 4°); the soil was black earth, the top layer having a moisture content of 30%, and was covered with short grass. Pine, Spruce, Larch, and Birch trees, ca. 20 m. long (mean diameter 30–40 cm.) were skidded by KT-12 tractor winch through a pulley suspended at a height of 10 m. First untrimmed, and then trimmed trees were skidded. It was found that the untrimmed/trimmed ratio of resistance to motion was: for Pine and Spruce ca. 1·40, for Larch, 1·31, and for Birch ca 1·11. Since the figure of 1·40 was obtained for the least favourable conditions (soft soil, and big trees with large crown and thick branches), the skidding of untrimmed trees appears to be economic, especially as most of the lop-and-top 'waste' is valuable material.

3896. Ivanov, M. M. Trelevka derevjev s neobrublennymi sučjjami v Sivinskom lespromhoze. [Skidding of tree-lengths with crowns intact in the Sivinsk Lespromhoz.] *Lesn. Prom.* 1950 (8), (6–7). 1 ref. [Russ.]

By felling trees in the usual sectors so as readily to obtain bundles of 6–10 untrimmed trees to be skidded by means of a winch, and by using the 'flexible-branch' method [cf. *For. Abstr.* 11 (No. 2887)] for loading the trimmed logs on lorries, the average man-day output was raised to 2·37 cu.m. compared with 1·3 cu.m. for trees trimmed on the felling site.

3897. Oreškin, S. I., and Baryšnikov, A. Vyvozka derevjev s neobrublennymi sučjjami. [Extraction of untrimmed tree-lengths.] *Lesn. Prom.* 1950 (12), (3–5). 1 ref. [Russ.]

Experimental skidding and hauling of untrimmed tree-lengths was done in 1950. The trees were skidded butt forward by paired TL-3 winches. Best results were obtained for Spruce of 20–24 cm. d.b.h. Preliminary results show that the over-all efficiency was raised by 15–20% (from 1·31 to ca. 1·7 cu.m./man-day).

3898. Neumoin, N. I. Trelevka lesa sparennymi lebedkami. [Skidding with paired winches.] *Lesn. Prom.* 1950 (5), (7–9). [Russ.]

An illustrated description of logging in stands of 2nd quality, where the logging areas were only 100 m. wide. Strips 560 m. long were logged using two TL-3 winches, one for each half of the strip, but only one spar tree. It is claimed that, owing to the concentration of work, the daily output is doubled and savings are also effected in power consumption and electric cable expenses.

3899. Lepencov, P. A., and Abolj, I. P. Novaja shema trelevki trehbarabannymi lebedkami. [A new method of skidding with 3-drum winches.] *Lesn. Prom.* 1950 (7), (7–8). [Russ.]

Describes a skidding arrangement with paired TL-3 winches. In order to obviate the manual hauling-back of the haulback cables, their two ends are connected, and, while one cable is being wound on to the auxiliary drum of one winch, the other cable is rolled off a similar drum of the other winch. The single spar is surrounded by a loading platform consisting of sleepers arranged fanwise. [Cf. *For. Abstr.* 10 (No. 2666).]

3900. Perfilov, M. A. Trelevka sparennymi lebedkami v Kuljminskom lespromhoze. [Skidding with paired winches in the Kuljma Lespromhoz.] *Lesn. Prom.* 1950 (9), (8–10). [Russ.]

Describes logging operations in the area adjacent to a narrow-gauge forest railway line. A pair of TL-3 winches was used, with two 15–18 m. spar trees 50–60 m. apart. The skidded logs were dumped alternately from either cable-line at a place on the railway line. A TL-1 winch powered two loading derricks. All three winches were supplied with current from a PES-50 mobile diesel-powered electrical unit. In 1949–50, several labour gangs worked according to this scheme, and the mean output per man-day varied from 3·5 to 5·5 cu.m.

3901. Miller, M. S., and Rešetov, A. V. Trelevka lesa lebedkami TL-3 s rasstojanija do 500 m. [Skidding with TL-3 winches from distances up to 500 m.] *Lesn. Prom.* 1950 (4), (8–10). [Russ.]

Skidding is conducted semi-aerially, using a single spar tree in the centre of the felling area. The working cable consists of two sections, 270 and 250 m. long, joined to each other and to the haulback cable by means of rings. A log load is attached to each of the two rings and both loads are moved at the same time: the first from the felling place to the mid-point of the haul, the other from the mid-point to the spar. An operator at the mid-point disconnects the log load arriving from the felling site and, when the cable is hauled back, re-connects it to the other ring.

3902. Zaïcev, A. I. Lebedočnaja trelevka v Kirišskom lespromhoze. [Winch skidding in the Kirish Lespromhoz.] *Lesn. Prom.* 1950 (4), (14–5). [Russ.]

An illustrated description of logging arrangements using the TL-3 winch. The area was divided into sectors of a circle, each of 10° angle, the centre of the circle being the spar, and its radius 250 m. After a preliminary clearing of the area round the

spar up to a distance of 60 m., the felling was done sector by sector, a 'corridor' 4–5 m. wide being first cleared along the middle of each to the perimeter of the circle. Felling preceded skidding by ca. 2½ sectors, and skidding was conducted semi-aerially. In summer, in stands carrying ca. 260 cu.m./ha., the output was ca. 56 cu.m./shift.

3903. Kiščenko, T. I. Vozdušnaja trelevka lesa. **[Aerial skidding of timber.]** *Lesn. Prom.* 1950 (7), (5–7). [Russ.]

Parallel experiments have shown that, when working in a stand with stocking of 120 cu.m./ha., and average tree volume 0·23 cu.m., aerial skidding gave an output per winch 50% higher than semi-aerial skidding.

3904. Miller, M. S. Trelevka lesa lebedkami v gornyh uslovijah. **[Winch skidding of trees in mountains.]** *Lesn. Prom.* 1950 (8), (7–9). 1 ref. [Russ.]

An illustrated description of a method of using the TL-3 winch for skidding on mountain slopes. The method provides for a tall spar tree at the foot of the slope, with two pulleys (for the working and the haulback cable); further up the slope and well into the felling site, two pulleys for the haulback cable are fixed to stumps or trees. The gathering cable with chokers is attached to the junction of the working and haulback cables. Owing to the topography, the width of the skidding area cannot exceed 100 m., and the direction of the trails ought to coincide as closely as possible with that of the maximum slope. In order to obviate the necessity of transporting the pulleys from one spar tree to another, a transportable pole has been developed, mounted on a sledge carrier. The whole process of erecting the pole by winch takes 45 min. The length of the working cable has been increased to 380 m. It has been found that the thickness of the haulback cable should be increased from 9·2 mm. to at least 12 mm., while the total length of the choker cable ought not to exceed 10 m. The choker should have a collar with clamp-screw to prevent logs breaking loose.

3905. Lepencov, P. A. Montaž iskusstvennyh mačt. **[Erection of artificial spars.]** *Lesn. Prom.* 1950 (11), (20–1). [Russ.]

3906. Erahtin, D. D. Metody ulučšenija eksploatacii lesovoznyh ledjanyh dorog. **[Methods of improving the efficiency of ice[-rutted] logging roads.]** *Lesn. Prom.* 1950 (10), (7–10). [Russ.]

The results of both laboratory and field tests have shown that: (1) A durable ice layer can be obtained when water is poured into the ice rut at an air temperature not above – 10° C. (2) The wear of ice is insignificant when the sledge runners are even and duly polished, hence the purpose of the supplementary watering of ruts is only to reduce friction. (3) At temperatures of – 10° C. and higher, the durability (resistance) of the road is abruptly reduced. (4) To prepare an appropriate snow cover for the draught vehicles (tractors and lorries) the snow ought to be first hoed and then compressed by the passage of a tractor, the operation being repeated after 12 hours. (5) In order to reduce friction on single-rut ice roads, hot water (50–60° C.) should be poured on to the rut immediately before the passage of the load. Solar oil is recommended for greasing the ruts in order to reduce starting friction; NaCl can be used for the same purpose if the temperature is not below – 25° C.

3907. Volodenkov, F. I., and Kožanov, D. I. Ulučšenie konstrukcii èlevatora ÈŽD-3. **[Improvement in the design of the ÈŽD-3 log loader.]** *Lesn. Prom.* 1950 (10), (21–2). [Russ.]

The new modification enables (1) logs of more than 50 cm. diameter to be loaded, and (2) the working cable to be hauled back mechanically. [Cf. *For. Abstr.* 9 (No. 2323).]

3908. Uusi koneellinen tukkien rautatievaunuihin kuormauslaite. **[A new mechanical device for loading logs into railway wagons.]** *Metsät. Aikak.* 1951 (5), (139, 141). [Fi.e.]

The 'Peto' log-loading device, originally designed for loading lorries, is manufactured by Kone and Terä Co. Two steel lifting arms, attached to the wheel hubs, can be raised or lowered by a winch driven from the lorry's motor, and are provided with movable log supports which can be adjusted to lift and load logs (1–3 at a time) to the desired height. For loading railway wagons, use is made of a pair of special side columns carrying spring-mounted steel skids, down which the logs roll into the wagon. A crew of 4–5 is needed, 2 in the wagon to place the logs in position, and the others on the ground to roll the logs on to the loader and to work the motor. In a time study the average loading time, using a 5-man crew, was 0·15 min./cu. ft. The advantages of the loader are its mobility, long loading reach and ease of loading. Disadvantages are its size, the cost of power (from a lorry motor) and the impossibility of loading from below the level of the rails.

3909. Ilon, B. Välj riktig redskap. **[Choose the right tools.]** *Skogsägaren* 27 (10; 11), 1951 (209–12; 231–3); 28 (1), 1952 (13–5). [Sw.]

Reproduces and discusses tables compiled by Sveriges Skogsägareföreningars Riksförbund showing the most suitable equipment for skidding, hauling and loading for different conditions (season, snow cover, site, road type, hauling distance, timber assortment etc.).

3910. Hakkarainen, A. Täysperävaunujen käyttömahdollisuuksista puutavaran autokuljetuksissa. **[The potential uses of trailers in the motor transport of timber.]** *Pap. ja Puu* 34 (4), 1952 (117–20). [Fi.e.] P.R.

Discusses the potential uses of the Norwegian Isachsen trailer, with steering gear, for Finnish timber transport. The large capacity of the trailer gives it considerable importance, though its cost may restrict its use. Its potential uses are greatest in districts where timber is transported to processing plants from an area with a radius of 50–200 km. and in watershed areas for transporting timber from one water system to another. In these cases it can compete economically with rail transport and floating. *From author's summary.*

3911. McCraw, W. E. **Selecting a tractor for skidding purposes.** *Sth. Lumberm.* 184 (2305), 1952 (64–5).

Discusses factors affecting choice of tractor, including maximum and average log size, terrain, skidding method, length of skidding distance, stand density and soil conditions.

3912. Fobes, E. W. **Improved harvesting methods. Equipment survey notes. Skidding and bunching tractor.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–42, 1951. pp. 1. P.R.

A new modification of the logging tractor with a shorter 'dozer' blade, ensuring better visibility and manoeuvrability.

3913. Fobes, E. W. **Improved harvesting methods. Equipment survey notes. Tractor pull-out chains.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–47, 1951. pp. 1 + 2 dgms. P.R.

An illustrated description of chains used in Wisconsin for pulling out bogged caterpillar tractors.

3914. I., B. En möjlighet att utnyttja hjultraktorn även på vintern. **[A means of using wheeled tractors in winter.]** *Skogsägaren* 26 (2), 1950 (28–30). [Sw.]

Describes the Rossön sledge attachment—an iron frame consisting of two I-beams running lengthwise on a heavy sledge. The weight of the rear part of the frame falls on the sledge and that of the front part on the back axle of the tractor to which it is coupled. This extra weight on the back of the tractor reduces the risk of skidding. The coupling is adjustable so that the amount of weight that falls on the axle can be varied with the size of the tractor. The attachment will take loads of about 10 tons, or 450 cu. ft. of timber. In a study of relative costs, the total transport costs per cu. ft. stacked measure were 18·1 and 35·0 öre for tractor and horse hauling respectively.

3915. F., G. En terränggående tankvagn för traktorservice. **[A cross-country trailer-tank for servicing tractors.]** *Skogsägaren* 25 (8), 1949 (152–3). [Sw.]

Describes a trailer-tank, mounted on crawler tracks, which holds 800 litres of tractor fuel, and has a compartment over the tank for spare parts, tools etc. The trailer with the full load of fuel weighs 1,700 kg.

3916. Pestal, E. Der Allradantrieb im Holztransport. **[Four-wheel drive in timber transport.]** *Mitt. öst. Ges. Holzforsch.* 4 (2), 1952 (17–9). [G.] P.R.

A critical comparison of 4-wheel-drive vehicles (of the Jeep, or German 'Unimog' type) with track vehicles.

3917. Bobkov, N. P., Šošin, N. A., and Cvetkov, B. S. Avtomobili ZIS-21A s gazogeneratornoĭ ustanovkoĭ CNIIMÈ-20, rabotajuščeĭ na syryh drovah. **[ZIS-21A lorries with the CNIIMÈ-20 gas-producer plant fed with green firewood.]** *Lesn. Prom.* 1950 (9), (12–4). [Russ.]

Describes the results of tests on the CNIIMÈ-20 gas-producer, conducted in 1949–50 at the Kovrovsk Lespromhoz. This gas-producer is designed to run on green firewood measuring ca. 500 × 50 × 70 mm. Its main characteristic is the pre-drying of firewood in the hopper by air blast. So far as propulsive properties are concerned, lorries with the CNIIMÈ-20 gas-producer are almost equal to those equipped with a gas-producer working with small Pine or Birch wood of lower moisture content.

3918. Fobes, E. W. **Improved harvesting methods. Equipment survey notes. Automatic trip stakes.** *Rep. U.S. For. Prod. Lab., Madison R*1637–45, 1951. pp. 1 + 2 photos. P.R.

An illustrated description of lorry stakes that are automatically tripped to dump the load, the driver remaining in his cabin.

3919. Miller, M. S., and Rešetov, A. V. Pereoborudovanie platform dlja vyvozki lesa v hlystah. **[Re-equipment of waggons for the transport of tree-length logs.]** *Lesn. Prom.* 1950 (5), (15–6). [Russ.]

Illustrated description of a tippable and rotatable retaining stake mounted on a waggon. One side of the stake is made of two fixed narrow-gauge rails joined in parallel and bent at right angles with the rail-base facing outwards; the other side is a tippable rail similarly bent with the rail-base facing inwards. The vertical portions of rail are 100 cm. long, and the width of the retaining stake is 194 cm., while the horizontal part of the tippable portion is 85 cm. The unloading is done with hoisting tackle, the cable of which is passed under the log load and tips up the tippable rail.

3920. Zavjjalov, M. A. Mehanizacija ukladki uzkokoleĭnogo lesovoznogo puti. **[Mechanization of track-laying for a narrow-gauge forest railway.]** *Lesn. Prom.* 1950 (8), (14–5). [Russ.]

Illustrated description of a wooden crane mounted on a narrow-gauge carriage, for laying narrow-gauge forest railway track. Crane plus carriage weighs ca. 7·2 tons, the capacity varies between 750 and 1,500 kg. as the horizontal distance of the load from the fulcrum varies from 7 to 3 m. Power is supplied by two TL-1 winches, or one TL-3 winch, which, together with an electric generator, are mounted on the crane carriage. Crane performance is ca. 560 m./8-hr. day, or 70 prefabricated track-lengths. A crew of 8 men, including 1 mechanic and 1 winch operator, is required.

378. *Water Transport*

See also No. 4404.

3921. Brofeldt, P. Miten pyritään teollisuuden ja uiton kalastukselle aiheuttamia vahinkoja ja haittoja vähentämään ja korvaamaan. **[Attempts at reducing and compensating the damage and disadvantages caused to the fishing trade by industries and timber floating.]** *Årsb. Finl. Flottårefören. 1951*, 1952 (37–48). [Fi.]

Discusses the failure of existing regulations for maintaining the fish population, including that under which power plants and floating associations are compelled to maintain fish breeding stations and to restock the rivers, and considers some new measures suggested for improving fish stocks.

3922. ARTIMO, A. Uiton kalastukselle järvivesissä aiheuttaman vahingon arvioimisesta. [**The assessment of damage caused by timber floating to lake water fishing.**] *Årsb. Finl. Flottarefören. 1951*, 1952 (49–57). [Fi.e.]

Discusses factors to be considered in assessing the damage.

3923. POLDUŠKIN, G. N. Aèrofotos'emka na lesosplave. [**Aerial photogrammetry in floating operations.**] *Lesn. Prom.* 1950 (7), (18–20 + 1). [Russ.]

An illustrated description of the use of aerial photogrammetry in floating operations on the rivers Vychegda, Sysola, and their tributaries, in 1949. The photogrammetric scale ranged between 1 : 10,000 and 1 : 3,000. Ca. 400,000 ha. of waterway was photographed.

3924. PROKOFJEV, B. M. Podgotovka prirečnyh skladov dlja mehanizirovannoï perevalki lesa. [**Preparation of river-bank depots for the mechanized launching of timber.**] *Lesn. Prom.* 1950 (6), (8–10). [Russ.]

Describes the construction and operation of launching installations at a log storage depot on the river Oyat' in Leningrad Province.

3925. LEVIN, M. B. Razmolevočnyï stanok s gibkoï ljuljkoï. [**Pontoon for untying and landing logs floated in bundles, with flexible cradle [for recovering sinkers].**] *Lesn. Prom.* 1950 (10), (23–5). [Russ.]

Illustrated description of a landing pontoon embodying a compartment with a flexible netting cradle suspended by chains. The bundles are untied in the compartment, the floating logs being manhandled as usual to the log hoist, while the sunken logs are retrieved periodically by raising the cradle with a winch.

3926. VILLIKKA, P. Nippusiteessä vaikuttavan voiman määräämisestä. [**Determining the strength of a tied bundle.**] *Pap. ja Puu* 34 (4*a*), 1952 (165–7). [Fi.e.] P.R.

A graph is given showing the relationship between the tensile strength of different kinds of binding (soft steel wire, chain or steel rope) used in bundling timber for towing, and their metric weight or price per metre. It is suggested that investigation is needed to determine suitable safety limits which will at the same time be economic in use. Measurements of tensile strength on timber bundles were made by coupling a dynamometer to the tied bundle and observing the changes in tensile force while the bundles were floated in the Kalkkinen rapids of the Kymijoki water system. Results are shown in graphs. The maximum force was 180–360 kgf. per binding, reached at a bundle speed of 2·6 m./sec. in a winding channel equipped with guiding walls. *From author's summary.*

3927. TRUFANOV, A. A. Vybor sečenija obvjazok splavnyh pučkov breven. [**Choice of section of binding materials for floated log-bundles.**] *Lesn. Prom.* 1950 (8), (20–3 + 5 photos). [Russ.]

The need for distinguishing between the strength of the binding and that of the bundle is stressed. The empirical formulae available for the choice of the cross-section of the binding (wires, chains) give adequate results only for a limited group of cases. The mathematical analysis leads to the following expression for the total thrust of the under-water part of the bundle $\Sigma p = \frac{g}{4}(\tan\alpha - \mu) \times (n^2 - n)$ and an analogous expression for the total thrust of the above-water logs $\Sigma p = \frac{g}{2}(\tan\alpha - \mu)(k^2 - k)$, where g is the buoyancy of the log, n and k are the numbers of the under-water and above-water log rows; α, half the angle formed by two symmetrical straight lines connecting the centres of 3 neighbouring logs (1 below and 2 above); and μ, the friction coefficient. The most probable value for α is 45°, and for this value the expansion thrust of a bundle is calculated to be

$$P = 0{\cdot}4\,(1-\mu)\,(1-\gamma)\left(\frac{1}{\gamma} - \frac{1{\cdot}43d}{H}\right)H^2l,$$

where γ is the sp. gr. of the wood; d, the average log diameter; H, the immersion of the bundle, and l, the bundle length. The cross-section of the binding can be easily evaluated from the P value. Tables are included showing the sections for wire and chain bindings, and the weight of binding per cu.m. of bundled logs.

3928. EKLUND, T. Puutavaralauttojen vetovastuksista ja mahdollisuuksista lauttauksen kehittämiseksi. [**[Factors affecting] the drag of timber rafts, and the possibilities of developing rafting.**] *Årsb. Finl. Flottarefören. 1951*, 1952 (81–165). 30 refs. [Fi.e.] Also as *Julk., Metsäteho, Helsinki* No. 27, 1952.

Tabulates the results of research on: rafting difficulty with different timber assortments; the effect of different types of raft (the chain of bundles, the bundle raft, and the log boom); the distribution of costs; and the effect of size of bundle, raft shape, the use of a plough of plywood boards in front of a chain of bundles, length of tow-rope and wind, on speed and cost of towing. There is a full English summary and legends to graphs and tables are in Finnish and English.

3929. SELIVANOV, P. A. Opytnyï proplav novogo plota konstrukcii Dalmatova. [**Experimental floating of the new Dalmatov raft.**] *Lesn. Prom.* 1950 (9), (19–21). 1 ref. [Russ.]

Illustrated description of a new raft suggested by Dalmatov in 1949. An experimental one of ca. 24,300 cu.m. and 430 m. long was floated for over 2,000 km. with good results.

3930. HUSTÝ, Z. O přesnějším a rychlejším výpočtu profilu plavební stoky methodou grafickou. [**Exact and rapid evaluation of floating-channel profiles by a graphical method.**] *Lesn. Práce* 30 (1), 1951 (27–35). [Cz.russ.e.]

A complete graphical solution is presented for the dimensions of a floating channel of semi-circular section appropriate to various diameters of log, along with 4 nomographs, which, it is claimed, yield much better results than the usual formulae.

3931. VOLODENKOV, F. I., and KOŽANOV, D. I. Besprokladočnaja ukladka breven v suda. [**Log**

stacking in barges without 'stickers'.] *Lesn. Prom.* 1950 (6), (16–7). [Russ.]

Illustrated description of an improved method of stacking logs on barges, ensuring a better utilization of space (0·6 as against 0·4 for the usual stacking with stickers). All the logs are stacked in one direction, i.e. parallel to each other, and contained by means of iron chains lengthwise round the log stack plus cross-cables connecting the corresponding links of two opposite chains. The number of chains depends upon log length. The 15·5 m.-wide barges are loaded with logs so that the successive log 'layers' between successive sets of cross-cables are 0·5, 0·6, 0·8, 1·0, and 1·1 m. high, the last mentioned layer being 11·5 m. wide. [Cf. *For. Abstr.* 12 (No. 3089).]

3932. JAKADIN, A. I. Kompleksnaja mehanizacija razgruzki barž. **[Complex mechanization of the unloading of barges.]** *Lesn. Prom.* 1950 (7), (16–8). [Russ.]

Illustrated description of a plant for the mechanical discharge of Oak logs on the Volga: ca. 100,000 cu.m. of timber is handled annually.

38. FOREST ENGINEERING

383. *Roads and Bridges*

See also Nos. 3583, 3906.

3933. MESNIL, H. Chemins forestiers. **[Forest roads.]** *Rev. Bois Appl.* 7 (5), 1952 (3–10). 2 refs. [F.]

Describes the four types of forest road in the Compiègne forest (varying from earth roads to highways treated with hydrocarbon binders that partly penetrate metalling) as well as three new techniques developed during the war (simple, improved, and stabilized, earth roads). The construction of an improved earth road at Rungis (Seine) in May, 1951, is described in detail.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

3934. SALWÉN, N. Dikningsproblem. **[The drainage problem.]** *Skogen* 37 (6), 1950 (124–5). [Sw.]

Describes with illustrations the lay-out of different drainage systems for the most effective drainage in a given area, and discusses costs.

3935. JÖNSSON, P. Lyckade försök med sprängmetoden vid dikningar i Jämtland och Härjedalen. **[Successful research on the use of explosives for draining in Jämtland and Härjedal.]** *Skogsägaren* 27 (3), 1951 (65–7). [Sw.]

In a drainage scheme in Härjedal, 3,496 m. was drained by blasting in stony difficult ground at a cost of Kr.1·23/linear m. The estimated cost for draining by hand labour had been Kr.1·59/linear m. More important was the saving of 254 working days out of 358 estimated as necessary for manual labour. The sides of the drains were generally very satisfactorily sloped. Cleaning out the drains, which should immediately follow the blasting, proved fairly cheap; in one scheme, where 3 men blasted and cleaned 7,000 m. of drain in about 6 weeks, the cost of blasting and cleaning amounted to 35 öre/m. and the total cost to the landowner (dynamite, labour, transport etc.) was Kr.1·17/m. The questions of safety regulations and of licences for dynamite are discussed. [Cf. *For. Abstr.* 13 (No. 2219).]

3936. LINDBERG, K. En transportfråga. **[A question of transport [of explosives for drainage].]** *Skogen* 37 (6), 1950 (123, 129, 137). [Sw.]

Describes with photographs: (1) a pannier-type box for carrying up to 20 kg. of explosive on the back of a bicycle; (2) a box used with a tubular-steel rucksack-type frame for carrying explosive where a bicycle cannot be used; (3) a special crowbar with a conical tip for making the charge holes; and (4) equipment for inserting the charge, consisting of a brass tube with a plunger. (1) and (2) have been approved by the explosives inspectorate. [Cf. *For. Abstr.* 13 (No. 1279).]

4. FOREST INJURIES AND PROTECTION

See also Nos. 3724, 3828.

3937. SORAUER, P. [Edited by APPEL, O., and BLUNCK, H.] Handbuch der Pflanzenkrankheiten. Sechster Band [, 1. Halbband]: Pflanzenschutz. Verhütung und Bekämpfung der Pflanzenkrankheiten. **[Manual of plant pathology. Vol. VI [, Pt. I]: Plant protection. Prevention and control of plant diseases and pests.]** Paul Parey, Lindenstr. 44–47, Berlin SW 68. 2nd ed., 1952. pp. xv + 448. Numerous refs. [G.]

The present instalment of this work [cf. *For. Abstr.* 12 (No. 2889)] deals with economic aspects of plant protection and with measures to prevent attack (cultural measures; disinfection and disinfestation of soil, seed and plants; and quarantine measures).

3938. PREBBLE, M. L., and BIER, J. E. **Protection of the forest against insects and disease.** Division of Forest Biology, Science Service, Department of Agriculture, Canada. 1952. pp. 8. 16 refs.

An account of forest protection in Canada.

3939. KALANDRA, A. Nemoci a škůdci topolů. **[Diseases and pests of Poplars.]** *Čsl. Les* 31 (23/24), 1951 (523, 526–8). [Cz.cz.]

A general account of fungus and insect diseases and pests of Poplar seedlings and adult trees.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 4014, 4022, 4027, 4032–5, 4039–40, 4056–7, 4060, 4062, 4064, 4068.

414. *Chemical Control*

See also Nos. 3951, 3986, 4015 *et seq.*, 4072.

3940. PATERSON, J. J., and SHANKS, G. L. **The effects of weed and insect sprays on spraying equipment materials.** *Sci. Agric.* 32 (4), 1952 (190–203). O.R.E.

Lists the effects of different compounds on various metals.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

3941. HENSON, W. R. **Chinook winds and redbelt injury to Lodgepole Pine in the Rocky Mountain Parks area of Canada.** *For. Chron.* 28 (1), 1952 (62–4). 2 refs.

Explains the distribution of 'redbelt', discolouration of the foliage of Lodgepole Pine at certain altitudes, by the behaviour of chinook winds, which occur with the movement of Pacific air over the Rockies. Alternation of warm and cool air during winter is needed to produce the condition.

422. *Temperature Influences. Frost. Heat. Drought*

See also No. 3947.

3942. PISEK, A. Zur Kenntnis der Frosthärte alpiner Pflanzen. **[The resistance of alpine plants to frost damage.]** *Naturwissenschaften* 39 (4), 1952 (73–8). 17 refs. [G.] [Botanisches Institut der Universität Innsbruck.] O.R.S.

Tests were made on twigs in the laboratory. Samples of *Pinus cembra* and of Spruce from the forest limit survived temperatures of – 40° and – 36° respectively. Resistance varied with the season, reaching its minimum in summer. Resistance in summer could not be increased by exposure to cold, but resistance in autumn could be thus increased; similarly, resistance could be decreased by exposure to warmth only in late winter. Frost damage in the open was found to be most severe at the southern edge of the stand, and on the side of the tree exposed to the sun. Literature on the relationship between frost resistance and osmotic value and sugar content is discussed. Further experiments showed that leaves could be dried out without damage to a far greater extent in winter than in summer. [Cf. *For. Abstr.* 12 (No. 947).]

3943. **Cause found for top-dying of California conifers.** *Rep. U.S. Bur. Pl. Ind. 1947/48*, 1948 (53).

Severe top-dying of Pines and other conifers in California was shown to be due to freezing of the inner bark. Only the thriftiest trees with fully exposed crowns are affected. The injury occurs when temperatures suddenly drop to freezing after unseasonably warm weather when the trees are dormant.

3944. CURRY, J. R., and CHURCH, T. W., JR. **Observations on winter drying of conifers in the Adirondacks.** *J. For.* 50 (2), 1952 (114–6). 3 refs. [Adirondack Research Center, Northeastern Forest Experiment Station, Paul Smiths, N.Y.]

Observations were made on the extensive defoliation of conifers that occurred during the winter of 1947–8, which was characterized by an unusual number of clear bright days with relatively great daily fluctuations in temperature. Since the greatest damage appeared on the south and south-west portions of the crowns, it seems likely that the injury was caused by long periods of bright sunshine that raised surface temperatures and stimulated excessive transpiration from the needles under conditions when replenishment from the frozen trunk and earth was impossible. Limbs immediately above the snowline were most severely affected. Browning and defoliation occurred on the following species in descending order of severity: *Picea rubens*, *Tsuga canadensis*, *Pinus strobus* and *Abies balsamea*. *Thuja occidentalis*, *Picea mariana*, *P. glauca* and *Pinus resinosa* showed relatively little damage.

T. canadensis and *P. strobus* recovered rapidly, but *P. rubens* and (to a less extent) *A. balsamea* showed

permanent damage and sometimes died, as a result of extensive killing of buds.

3945. Lutz, H. J. **Occurrence of clefts in the wood of living White Spruce in Alaska.** *J. For.* 50 (2), 1952 (99–102). 7 refs. [Alaska Forest Research Center, Juneau.]

Internal clefts which occur in fast-grown White Spruce in Alaska are described and illustrated. They are believed to be the result of collapse caused by unbalance between loss and replenishment of water. The injury occurs in the outermost annual ring during the dormant period when absorption of water from the soil by tree roots during the late autumn, winter and early spring, is completely prevented by ground freezing or greatly reduced by low soil temperatures and poor soil aeration. In these conditions water lost by transpiration from aerial organs cannot be replenished from the soil and unbalance results. The structure of the wood in the damaged trees is evidently a factor contributing to the injury; growth is relatively rapid, the early wood is thin-walled, and the late-wood zone is poorly developed. [Cf. *For. Abstr.* 11 (No. 3245); 13 (Nos. 3054, 4367).]

424. *Soil Conditions. Erosion Effects*

See also Nos. 3786, 4072.

3946. Day, W. R. **Root disease of conifers in relation to soil conditions. (*a*) Development of butt-rot in conifers in relation to soil depth. (*b*) The dying of Sitka Spruce.** *Rep. imp. For. Inst. Oxf. 1950/51*, 1952 (13–4).

The relationship between rooting depth, drainage, and root disease and butt rot on various sites in Scotland was investigated for European and hybrid Larches, Western Hemlock (*Tsuga heterophylla*), Sitka Spruce and Douglas Fir. The sites examined were well drained topographically, but showed an appreciable degree of compaction, or impedance in drainage, in the subsoil. The upper soil layers, in which root development mainly occurred, were generally of good structure and adequate fertility. In these conditions, the development of root disease with subsequent infection and butt rot by *Fomes annosus*, was found to be related to soil depth as a principal factor determining the adequacy of growing space and nutrient supply for root development and action. In the sites investigated, root disease and butt rot became more severe the nearer the underlying unfavourable soil was to the surface [cf. *For. Abstr.* 12 (No. 3345)].

Norway and Sitka Spruce were investigated in Newcastleton Forest, Dumfriesshire, where the trees were dead or dying in small patches on acid clay soils covered by peaty raw humus. The root systems were characterized by relatively good development of the main root framework combined with a very poor development of the finer feeding roots everywhere except in the thin surface humus layer. It is concluded that the cause of the disease is the poor conditions of water supply during really dry periods in soils which encourage an extensive but relatively inefficient development of the root system.

3947. Day, W. R. **Death, die-back and canker of *Pinus contorta* (Lodgepole Pine).** *Rep. imp. For. Inst. Oxf. 1950/51*, 1952 (15–6).

Two examples of dieback of this species were examined. Its causes appear principally to have been root disease associated with poor drainage conditions on a peat soil, and frost injury. It is clear that some strains of Lodgepole Pine are susceptible to severe frost injury in Great Britain and that care in selection of strains is needed.

3948. Němec, A. **Studie o hadcové lesní půdě se zřetelem k jejímu obsahu chromu a resorbci chromu krnícím porostem borovice. [Study of a serpentine forest soil with regard to its Cr content and the uptake of Cr by a stunted Pine stand.]** *Sborn čsl. Akad. zeměd.* 24 (5), 1951 (395–404). 11 refs. [Cz.russ.e.] C.G.B.

Apart from the excess of Mg and the relatively small content of Ca, K, and P in the serpentine soils of the Bystrina forest range, the poor growth of Pine in this area is related to a high content of Cr (from serpentine) in the upper layer of the soil, amounting to ca. 5 mg. citric-acid-soluble Cr_2O_3 per kg. of soil. Data are presented of the Cr content in the foliage, bark, stem, and roots. The main cause of poor growth of Pine seems, however, to be the excess of Mg in the soil, combined with the lack of other mineral nutrients; but the Cr toxicity threshold values are not yet known for forest trees.

3949. Stoate, T. N. **Nutrition of the Pine [*Pinus radiata*].** *Bull. For. Timb. Bur. Aust.* No. 30, 1950 (1951). pp. 61. 38 refs.

The report covers investigations extending over nearly 25 years, into the nutrition of Pine in Western Australia, where the successful establishment and growth of Pine plantations has been made possible on poor and infertile soils formerly regarded as unsuitable. Standards of relative soil fertility for Pine have been developed on the basis of their P content.

The morphological characteristics of the symptoms of a number of disorders of both *Pinus radiata* and *P. pinaster* are described. The Leiria strain of *P. pinaster* is of great importance, not only because of its better form and faster growth, but because it appears to be better adapted to the poor coastal sands.

The history is traced of the early trials with animal manures, P and N fertilizers and trace elements, commencing with $FeSO_4$ and leading finally to the widespread use of superphosphate and Zn. Superphosphate is a corrective and preventive of the disorders of *P. pinaster* on the poor sands of the coastal plain, and also, in some plantations at least, of the group of disorders leading from 'yellowing' to 'spindle stands' and 'dead top' in *P. radiata*. Zn is a corrective and preventive of the group of disorders from rosetting to dieback, which are characterized by a dieback of the leader and a tendency to broom-bush conditions in both *P. radiata* and *P. pinaster*. Very heavy dressings of superphosphate have corrected some of these disorders on some soils. In a few plantations where the Myalup disorder in *P. pinaster* develops, either Zn or P may be used.

In South Australia, spraying with Zn has become standard practice in the establishment of *P. radiata* plantations in the south-east. Striking responses to superphosphate have been shown by both *P. radiata* and *P. pinaster* in certain plantations in the Mt. Lofty Ranges.

It appears that the effect of a corrective treatment is lasting if it can induce sufficient growth to bring about a closing of the canopy and complete control of the site. Satisfactory growth has been maintained for 16 years without further applications of fertilizer. An interesting discovery has been the good development of natural regeneration of *P. radiata* on a fire-killed area previously sprayed with Zn. This contrasts with the disordered condition of the regrowth a few feet away on unsprayed land. Indications of the adaptation of the Pine to a hitherto very unfavourable site have been shown in the colonizing of adjoining blank areas with regeneration from trees grown with superphosphate, and this if continued would have far-reaching results.

Puzzling problems in Pine nutrition still remain and the investigations must be continued. *From author's summary.*

3950. PIRONE, P. P. **Foliage application of nutrients.** *Proc. nat. Shade Tree Conf. 1951* (23–35). 10 refs.

As a result of experiments over 3 years it is concluded that both N and P can be absorbed directly by leaves when applied in a complete-nutrient spray in sufficient concentration. The resulting increase in growth in treated plants was healthy and balanced, with no indication of unbalanced or over-succulent growth, which would occur if only one major nutrient, such as N, were entering. Among species treated were European Limes, London Plane, Pin Oak, Norway Maple, American Elm, Box and Holly. The sprays used were solutions of one or other of two complete commercial fertilizers, Rapidgro and Nutreen.

3951. STRADER, J. D. **Ohio roadside development course.** *Amer. Nurserym.* 95 (9), 1952 (9–10, 72–4).

A paper by *L. C. Chadwick* describes the following methods of applying liquid manure to roadside trees and shrubs: (1) *The jet lance.* This consists of a pipe 40–48 in. long and ¼–½ in. inside diameter, fitted with a tapered tip having a ⅛-in. hole drilled in the point. A valve fitting is inserted at the other end and is connected directly to the spray tank by means of a hose. A pressure of about 200 lb./sq. in. is normal for light to medium soils; for heavy soils one of 300–350 lb./sq. in. is often used. The lance is inserted into the soil at an angle of about 45°, fairly close to the tree at first, and is moved progressively outwards. Depth of penetration should vary from 10 to 20 in. Two formulae are used: (*a*) 50 lb. ammonium sulphate, 10 lb. diammonium phosphate and 10 lb. potassium chloride in 300 gal. water, at a rate of 300 gal. solution to a tree of 2–2½ ft. diam.; (*b*) 15 lb. ammonium sulphate, 10 lb. diammonium phosphate, 5 lb. 60% potassium chloride, applied at 1 gal. per in. of stem diameter. (2) *Foliar sprays.* A soluble fertilizer is used with a sticker-spreader. On large trees a pressure of 200 lb./sq. in. is necessary. On shrubs a knapsack sprayer is adequate. The quantity of spray varies with size of tree. Chemicals used are mainly compounds containing N and P.

425. *Chemical Influences (Atmospheric)*

See Nos. 4018–9.

43. FOREST FIRES

See also No. 4036.

432. *Prevention and Control*

See also Nos. 3556, 4134.

3952. PEREIRA, O. DUARTE. Aspectos penais do incêndio rural, segundo a legislação vigente. [**Penal aspects of land burning, according to the law now in force.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (131–55). [Port.e.]

Reviews definitions of punishable types of burning in forestry and agriculture, and the penalties attached, according to the legal systems of various countries (including France, Italy and Argentina), and compares them with the Brazilian law.

3953. JAMES, N. D. G. **Railways and woodland fires.** *J. Land Agents' Soc.* 51 (5), 1952 (196–9).

Explains the effects of the Railway Fires Act (1905), and protective measures to be taken when a railway runs through or beside plantations.

3954. [**The efficiency of aerial patrols in the detection of lightning fires.**] *Rep. Nth. Rocky Mt. For. Range Exp. Sta. 1951,* [1952] (23–4).

A new type of smoke bomb was used to test the efficiency of observations from 2 patrol aircraft and 4 ground positions. Detection from the air was better at all times of day for smoke on upper slopes of mountains, because the smoke is seen against a dark background of trees.

3955. T., A. Sovětské stroje, nástroje a přístroje pro boj s lesními požáry. [**Soviet machines, tools and appliances for forest fire suppression.**] *Čsl. Les* 31 (16), 1951 (346–50). [Cz.]

A compilation based on *Zima, I. M.*, 'Mehanizacija lesohozjajstvennyh rabot' (Mechanization of forest management work). The hand-operated fire engines 'Red Torch' and 'Challenge' weigh 115 kg. each, and their output is 175–200 litres/min. The simplest power-operated fire engine (with a twin-stroke, 11–12 h.p. internal-combustion engine) weighs 60 kg. and delivers 700 litres/min. A new model weighs 28 kg. with an output of 300 litres/min. The motor-car fire engines have an output of 900 litres/min. Water-tank lorries of 2,000, 3,000, and 4,500 litres capacity are used for small fires in places without water supply. A motor-cycle combination has been developed, with an independent power pump in the side-car. Twin-share forest ploughs (horse or tractor-driven) are used for checking the spread of forest fires. Shrub-cutters are efficient in cutting a 3·5-m. swath where trees are less than 20 cm. in diameter.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See also No. 4459.

3956. STAHELIN, R. **Forest fire damage to Pines planted in hardwood stands.** [*Bienn.*] *Rep. Ala. agric. Exp. Sta. 1947–48*, 1950 (29–30).

An 80-acre tract of young hardwoods underplanted with Slash and Loblolly Pines in 1941 was burnt over by a wild fire in 1947. The fire had no visible effect on uncut hardwoods, but killed many of the Pines even where the surrounding forest litter was hardly touched. Young hardwood coppice shoots were killed back but most hardwood clumps sent out fresh shoots in the following spring. More Loblolly than Slash Pines were killed.

3957. BYRAM, G. M., and NELSON, R. M. **Lethal temperatures and fire injury.** *Res. Notes Stheast. For. Exp. Sta.* No. 1, 1952. pp. [1] + 1 gph.

Results of a series of experiments by the water-bath method to determine lethal temperature for needles of Loblolly, Longleaf, Slash and Pitch Pines are given in a graph. There is no great difference between the species tested. All show a considerable range of lethal temperature, 52–64° C., varying inversely with exposure time, 0–14 min.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

3958. **[The effect of slash burning on soil pH.]** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1950*, 1951 (38–9).

An examination of Douglas Fir plots after 2 years indicates that light burning raises the pH only slightly above normal and that the effect is temporary. When the fire was hot enough to burn all the organic material and change the soil to a reddish-orange colour, pH was high, and return to a normal moderately acid state was slow. Laboratory tests showed that soil reaction rose to strong alkalinity in fairly direct proportion to the temperature and duration of heat to 1,200° F., where the increase in pH levelled off; different soils had different reactions, some rising to greater alkalinity than others. Germination of Douglas Fir seed was not affected by a range in soil pH from 4·5 to 8·8; both the lowest (50%) and the highest (68%) germination occured on soils at pH 5·5.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 3778–82, 3870, 4072.

3959. MAŘAN, B., and LHOTA, O. **Buřeň—naš největší nepřítel při zalesňování a zakládání ochranných lesních pásů. [Weeds—our greatest enemy in afforestation and in establishing forest shelterbelts.]** *Sborn. čsl. Akad. zeměd.* 25 (1/2), 1952 (39–54). 11 refs. [Cz.russ.] C.G.B.

Presents results of investigations conducted at Obřistvi in 1951. The physical properties of the soil were unfavourable: during the dry period, the soil moisture fell to only 1·31%. The observations were conducted on Poplar plants put out in February. Growth was above the average on cultivated, manured, and weeded areas. Manuring alone was not enough, particularly in dry and weed-infested places. Best results were observed when sugar beet and blue lupins were sown between the Poplar rows. The dry weight of weeds in some places near Obřistvi was ca. 10·5 tons/ha, a figure corresponding to ca. 315 mm. of water transpiration between March 31 and July 31. The rainfall for this period being 237·1 mm., the loss of water from the soil, due to weed growth, amounted to over 70 mm. The weeds also removed CaO, MgO, P_2O_5 and K_2O from the soil in quantities 2–4 times larger than that used by the main agricultural crops. It was found that sparsely sown cereals (wheat, rye, barley, oats) improve the microclimate by lowering the soil temperature, suggesting that they might be used when afforesting dry and/or sandy areas or establishing shelterbelts.

3960. GRANO, C. X. **How do sulfamate poisons kill trees.** *J. For.* 50 (4), 1952 (318).

Cupric sulphamate in crystal form was applied in notches at 6-in. intervals round the boles of several trees of *Quercus falcata* at ground level. Ten months after treatment the trees were felled and the trunks cross-sectioned at frequent intervals for examination. Radial movement of the poison, as shown by a brownish discoloration, went to the heartwood and then stopped. There was no visible tangential movement. Downward movement into the roots could be followed for at least 2 ft. In one tree, upward movement could be traced for at least 32 ft. No stain appeared in the crown section of the boles, though the crowns showed damage and many leaves and branches had died.

3961. WOLF, D. E. **CMU—a new herbicide.** *Proc. 8th ann. Nth. Cent. Weed Control Conf.* 1951 (104).

CMU is the abbreviated name given to 3-(*p*-chlorophenyl)-1,1-dimethylurea, a compound with outstanding weed-killing properties. It has been formulated into a wettable powder, containing 80% by weight of the active ingredient. As a soil sterilizer it can be used at a rate of 20–80 lb./acre, the effect lasting (for the higher dosages) up to 18 months. It can also be used as a selective weed-killer on certain crops. There are indications that the compound is translocated. Experiments to investigate this point are in progress.

3962. ELWELL, H. M. **Report of brush control investigations on hardwood.** *Proc. 8th ann. Nth. Cent. Weed Control Conf.* 1951 (72–4).

A further report on experiments at the Red Plains Conservation Experiment Station, Guthrie, Okla. [cf. *For. Abstr.* 13 (No. 1224)]. The ester formulations of 2,4,5-T and 2,4-D gave the best control of brush. Of the non-selective herbicides tested CMU (3-*p*-chlorophenyl 1,1-dimethylurea) applied at a rate of ½, 1 or 2 lb./gal. water, gave results equal to or possibly better than ammate. Foliage sprays from aircraft were most adequate when delivered as a coarse spray from powerful slow-flying planes. Winter basal stem sprays of Oak were effective on

saplings and smaller trees. Good results were obtained with heavy ester formulations of 2,4,5-T (8 lb./100 gal. diesel oil) or 2,4-D (16 lb./100 gal. diesel oil). Amine formulations of 2,4-D or 2,4,5-T (48 lb./100 gal. water) applied as a basal spray in early winter, also produced a high degree of kill in both top and roots. Ammate applied in axe incisions round small trees of 10 in. diam. or less (either as crystals or as a solution of 5 lb. ammate/gal. water) were very effective. Knapsack sprayers or fire-fighters are efficient for basal stem spraying or small thickets. A suitable spray for stumps is 3 quarts 2,4,5-T/14 gal. diesel oil. Ammate paste or sprays (5 lb./gal. water) were also used on stumps with success.

3963. COULTER, L. L. **Two primary factors influencing results in the control of Oak during the dormant period.** *Proc. 8th ann. Nth. Cent. Weed Control Conf.* 1951 (76–7).

The relationship of spray volume to concentration was tested on *Quercus alba* by applying 7 different concentrations of 2,4,5-T ester in diesel oil at volumes of 3 ml., 7 ml., and 11 ml. per in. of stem circumference. The importance of volume is clearly demonstrated by the fact that 4 lb. acid equivalent/100 gal. at a high, or even moderate volume, gave better results than a concentration of 40 lb. applied in a low volume. The importance of point of application was also studied. Clumps of Oak coppice, 3 years old, were hand painted at various points with No. 2 fuel oil containing 16 lb. acid equivalent 2,4,5-T as the propylene glycol butyl ether ester per 100 gal. of mixture. When the basal 15 in. or the whole of the bottom half of the stem were treated, a complete kill was obtained in the aerial portions of the plant. The fact that new shoots appeared from the old stump may be attributed to the low volumes used. The central portion of the stem proved relatively resistant.

3964. DAY, M. W., HAMNER, C. L., and PANSHIN, A. J. **Preliminary observations on the effect of 2,4-D and 2,4,5,-T on Aspen.** *Quart. Bull. Mich. agric. Exp. Sta.* 34 (3), 1952 (266–74). 3 refs.

Results, by autumn 1951, of treatments between March and July are tabulated and the following conclusions are drawn: (1) Water solutions of 2,4-D amine salt and ester in 6,000 p.p.m. concentrations, applied as stem spray or to girdles, are not effective in killing Aspen. (2) Diesel-oil solutions of 2,4-D amine salt and ester and 2,4,5-T ester in 6000 p.p.m. concentration are effective in varying degrees. The 2,4,5-T ester was the most effective and the 2,4-D ester next, while the 2, 4-D amine salt gave inconsistent results. Spraying appeared to be more effective than frill girdling and as effective as complete girdling followed by spraying. No conclusive evidence was found as to the effect of season or weather on results. No bark loosening was apparent on trees that died during the first growing season, but pulpwood cut from a few such trees peeled more easily than green wood felled at the same time.

3965. EGLER, F. E. **Herbicide effects in Connecticut vegetation, 1950.** *J. For.* 50 (3), 1952 (198–204).

[For earlier reports on this project see *For. Abstr.* 13 (No. 400).] Basal spraying of woody plants of less than 2 m. in height appears to be more effective than foliage spraying. Larger thick-barked trees are highly resistant and require frill-girdling and trunk wounding or very large volumes of spray. The season of the year appears to have no effect on results. Solutions of 4–6% mixtures of 2,4-D and 2,4,5-T esters have been used successfully. In general, upper portions of the shoot system not only need not, but should not be sprayed. A healthy, unsprayed, upper portion continues to grow and probably tends to exhaust the root system of nourishment which cannot be replaced by movement down through the damaged bark. This slow dying is important in killing the roots of suckering species such as Aspen and Sumac, in which rapid killing of the upper portions appears to stimulate the development of suckers at some distance from the trunk.

3966. FISHER, C. E., YOUNG, D. W., and MARION, P. T. **Control of Mesquite.** *Progress Report, Texas Agricultural Experiment Station* No. 1320, 1951. pp. 7.

Describes current methods of controlling Mesquite with 2,4,5-T and 2,4-D. [Cf. *For. Abstr.* 13 (Nos. 335–7, 1307).]

3967. **Japanese Honeysuckle [*Lonicera japonica*] eradication: a preliminary report of the effectiveness of various weed killers.** *Pa. For. Wat.* 4 (1), 1952 (13, 24).

Good results were obtained by spraying with a 1% aqueous solution of 2,4-D amine (65% acid). For heavy infestations the amount of water should be doubled. April appeared to be the most favourable month for operations.

3968. MUZIK, T. J., LOUSTALOT, A. J., and CRUZADO, H. J. **Movement of 2,4-D in soil.** *Rep. fed. Exp. Sta. Puerto Rico* 1951 (25).

Data obtained in dry and wet soils showed that the diethanolamine salt of 2,4-D did not move beyond the surface inch of soil, and little, if at all, beyond the first ½ in. [Cf. *For. Abstr.* 12 (No. 3366).]

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

3969. **Mistletoe control in national parks.** *Rep. U.S. Bur. Pl. Ind. 1948/49*, 1949 (67).

Investigations of dwarf mistletoe [*Arceuthobium* sp.], which has been invading Ponderosa Pine stands in several national parks in the West, have shown that satisfactory protection can be obtained by establishing a 60-ft. mistletoe-free zone. This requires 3–4 pruning and removal operations. Studies show that seed of dwarf mistletoe are ejected with sufficient explosive force to carry them upwards and outwards for 60 ft. The parasite invades trees most easily in the part constituting the last 2 years' growth, and it takes 1–5 years or more to produce shoots on the Pine. Mistletoe seeds are not produced until at least the second season after infection. Pruning or tree removal should be done every 2 years to prevent seed dispersal in the affected area. No chemical spray has been found that will kill the mistletoe without damaging the Pine.

3970. BUCKLAND, D. C., and MARPLES, E. G. **Management of Western Hemlock infested with dwarf mistletoe.** *B. C. Lumberm.* 36 (5), 1952 (50–1, 136–140).

The following conclusions are drawn from a study of stands on Turnour Island: (1) Clear felling to maintain stands of fairly uniform age, reduces rate of infection and ultimate damage by mistletoe [*Arceuthobium campylopodium* f. *tsugensis*]. Because of a high incidence of mistletoe in the present mature and overmature stands, partial felling or leaving advance growth in clear felling, will maintain or increase mistletoe damage. (2) Past methods of logging have left trees of poor form and vigour to seed in felled areas. The progeny of such trees have a low resistance to attack by mistletoe and decay. (3) The reduction of vigour as a result of mistletoe attack renders stands more liable to insect epidemics.

443. *Fungi and Bacteria*

See also Nos. 3937–9.

3971. SAWADA, K. **Fungi on conifers in the Tohoku district. II. Fungi on conifers other than Sugi [*Cryptomeria japonica*].** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 46, 1950 (111–54). [Jap.]

Describes 88 species, including descriptions in Latin of the 54 new species, supplemented by large scale drawings, and lists the fungi under their hosts. [Cf. *For. Abstr.* 13 (No. 413).]

3972. THOROLD, C. A. **The epiphytes of *Theobroma cacao* in Nigeria in relation to the incidence of black-pod disease (*Phytophthora palmivora*).** *J. Ecol.* 40 (1), 1952 (125–42). 19 refs. [Department of Agriculture, Nigeria.]

Rating of trees according to the number and kind of epiphytes, gives a fair degree of probability in forecasting incidence of the disease, since both epiphytes and disease are dependent on climatic conditions.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 3769–71, 3784–5.

3973. CARRERA, C. J. M. La enfermedad de las almácigas de coníferas. Estudio de los agentes etiológicos. **[Damping off in conifer nurseries in Argentina. A study of the pathogens.]** *Bol. Fac. Agron. Vet. B. Aires* No. 30, 1951. pp. 66. 43 refs. [Span.e.]

Reviews world literature on the subject since 1882, and reports an investigation into the fungi causing damping off in Argentina. The following pathogens were isolated:—*Rhizoctonia solani, Pythium ultimum, Fusarium bulbigenum, F. avenaceum, F. arthrosporioides, F. graminearum, F. orthoceras, F. oxysporum, F. solani* and *F. vasinfectum.* The susceptibility of seedlings in various stages of development was studied, and it was established that *R. solani* is active in causing disease longer than the other fungi. The most susceptible part of the plant is about 1 cm. above the root collar. The following aspects were also studied: (1) production of toxins by the fungi; (2) the influence of different culture media on their growth; (3) the action of various concentrations of organic acids on growth; (4) the influence of temperature on growth; (5) the effects of pH on growth; (6) the influence of the addition of certain chemicals to the culture media. The following had an inhibitory action: β-naphthol, hydroxy-mercury-nitrophenol, 8-hydroxy-quinoline, sodium mercury phenolate, $HgCl_2$, Lapacho [*Tabebuia* sp.] sawdust. [Cf. *For. Abstr.* 10 (No. 2252).]

3974. BATISTA, A. CHAVES. ***Cylindrocladium scoparium*** Morgan var. ***brasiliensis*** Batista e Ciferri, um novo fungo do Eucalipto. **[*C. scoparium* var. *brasiliensis*, a new fungus attacking Eucalypts.]** *Bol. Sec. Agric. Ind. Com., Pernambuco* 18 (3/4), 1951 (188–91 + 3 plates). 9 refs. [Port.e.]

The new variety, which is described and illustrated, causes both damping off in the nursery and dieback of adult trees in Brazil.

443.3. Diseases of Older Stages

See also Nos. 3843, 4052, 4058.

Stem, Butt and Root Rots; Root Diseases

See also Nos. 3946–7.

3975. DAVIDSON, A. G. **Decay of White Spruce in New Brunswick.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (1).

3976. WHITNEY, R. D. **Relationship between entry of root-rotting fungi and root-wounding by *Hypomolyx* and other factors in White Spruce.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (2–3).

Further investigations on this subject [cf. *For. Abstr.* 13 (No. 1386)] showed that direct entry of decay fungi through areas on roots bared by insect damage is of less significance than entry through root ends after girdling by the insect. Of 200 trees analysed, 130 had root rot, 123 had damage to roots by *Hypomolyx*, and 103 of the infested trees (83%) had root rot. *Hypomolyx* was considered to have caused 62·3% of all fungus infections.

3977. FOSTER, R. E., and FOSTER, A. T. **Studies in forest pathology. VIII. Decay of Western Hemlock on the Queen Charlotte Islands, British Columbia.** *Repr.* from *Canad. J. Bot.* 29 (5), 1951 (479–521 + 26 photos). 28 refs.

Decay losses in old-growth stands are appreciable, amounting to 13·9, 8·0, and 10·7% of the gross volume of logs of grades 1, 2 and 3 respectively. Total loss, including dead trees, amounted to 25·5% of the gross volume. Twenty-seven decay-producing fungi have been isolated. The most important of these are *Fomes pinicola, F. pini, F. annosus,* and *Polyporus sulphureus. Echinodontium tinctorium* apparently does not occur in the region. Scars provided the most frequent, and roots the most important, avenue of entrance for decay. The logs of 2,318 Western Hemlock were analysed in detail. Decay was found to increase progressively with diameter, age, and decreasing site quality. Maximum net periodic increment was reached between 350 and 400 years of age and between 35 and 40 in. in diameter. Colour of bark was found to provide an added indication of tree maturity. Understorey

trees were found to give a substantial yield of sound wood. [Cf. *For. Abstr.* 12 (No. 711).] *From authors' summary.*

3978. Domański, S. **Zgnilizny odziomkowe sosny zwyczajnej i próba oceny ich warunków rozwojowych. [Butt rots in Scots Pine and an attempt at estimating their developmental conditions.]** *Sylwan* 96 (1), 1952 (5–30). 25 refs. [Pol.pol.e.]

Presents results of an investigation on butt rot in 6 Scots Pine stands (age 69–119 years) growing on sandy-loam soils. Disks taken from stumps after felling were examined, and out of 969 disks, 367 showed rot, mainly in the heartwood. The causal organisms were (in descending order of incidence): *Polyporus circinatus* (very much the most frequent), *Fomes pini*, *Sparassis crispa*, *Polyporus schweinitzii*, *Armillaria mellea*, and *F. annosus*. The incidence of the two first mentioned fungi was distinctly low in one 73-year-old stand on sandy soil over clay, with pH 5·4 at a depth of 1 m., but very high in 5 other stands on sandy-loam soil of pH 6·2–6·6. It is suggested that *P. circinatus* attacks only via deep roots; it is a constant component of the Scots Pine biocoenosis, and causes losses in the older age classes of this species.

3979. Jørgensen, E., and Petersen, B. B. **Angreb af *Fomes annosus* (Fr.) Cke. og *Hylesinus piniperda* L. på *Pinus silvestris* i Djursland plantager. [Attack by *F. annosus* and *Myelophilus piniperda* on *P. sylvestris* in the Djursland plantations.]** *Dansk Skovforen. Tidsskr.* 36 (9), 1951 (453–79). 14 refs. [Dan.e.]

Damage to 62 of the 69 dead and dying trees examined was found to be caused primarily by *F. annosus* and only secondarily by the equally severe attack by *M. piniperda*. *F. annosus* was found in all thinned stands but was absent from stands that had not been thinned. Standing trees with as much as ½ of the root system attacked did not necessarily show any signs of disease. It could not be established which roots were first attacked, but wherever dead tap roots were observed there were several dead lateral roots. The trees react to attack by secreting a considerable amount of resin round the root collar, but discoloration of the stump surface was rarely found. Conidiophores of *F. annosus* were twice found under the bark scales on Pine roots. Attack by *M. piniperda* was always on trees already weakened by *F. annosus*. The winter burrows at the base of the stems did not appear to damage the trees. Feeding on the young shoots was everywhere severe. Many new egg tunnels were found in spring before feeding had begun to any extent. No active control of *F. annosus* in the stands can be recommended as effective. *M. piniperda* was present in such large numbers that trap logs did not prevent attack of standing trees. Parasites and other bark-beetles found in the stands are listed.

3980. Bakshi, B. K., and Bagchee, K. **Principal diseases and decays of Oaks in India.** *Indian Phytopath.* 3 (2), 1950 (124–36 + 3 plates). 17 refs. O.B.D.

Results are given of culture studies of 7 fungi causing Oak rot in India and elsewhere, with descriptions of the sporophores and the types of rot caused. *Stereum princeps*, *Polyporus sulphureus*, *P. obtusus*, *P. cuticularis* and *Fomes fomentarius* attack both living and felled timber, the first three being wound parasites. *P. obtusus* is described for the first time in India. *Polystictus xerauticus* and *Trametes dickinsii* are important destroyers of slash. *From authors' summary.*

3981. Fernandes, C. Taveira. **O combate à 'doença da tinta' dos castanheiros no ano de 1947—estudos e tratamentos. [Chestnut 'ink' disease during the year 1947—studies and control measures.]** *Publ. Serv. flor. aqüic. Portugal* 15 (1/2), 1948 (41–61 +1 tbl.). [Port.e.]

Wilts, Diebacks etc.

See also Nos. 3843, 3947, 3974, 3999.

3982. Liljestrand, M. **Om topptorka på gran. [Stagheadedness in Spruce.]** *Skogen* 37 (10*), 1950 (101*, 105*). [Sw.]

Pucciniastrum padi and *Crumenula abietina* were isolated from stagheaded young Spruce in different parts of Sweden.

3983. Fraselle, J. V. ***Fusarium oxysporum* Schl. F. as the cause of vascular wilt disease of the oil palm (*Elaeis guineensis*).** *Trans. Brit. mycol. Soc.* 34 (4), 1951 (492–6). 10 refs. O.B.D.

Describes inoculation experiments with *Fusarium oxysporum* on *Elaeis guineensis*, proving the pathogenicity of this organism to the palm.

3984. Prasad, N., Mehta, P. R., and Lal, S. B. ***Fusarium* wilt of Guava (*Psidium guyava* [*guajava*] L.) in Uttar Pradesh, India.** *Nature, Lond.* 169 (4305), 1952 (753). 7 refs.

The name *Fusarium oxysporum* f. *psidii* is proposed for the causal organism.

3985. Hepting, G. H., Toole, E. R., and Boyce, J. S., Jr. **Perithecia produced in an unpaired isolate of *Chalara quercina* and its possible significance in Oak wilt control.** *Plant Dis. Reptr.* 35 (12), 1951 (555). A.P.B.

Preliminary report on a culture from an infected tree which produced perithecia without being paired with any other culture. Such fungi may be important in the spread of the disease above ground. Investigations continue.

3986. Hoffman, P. **Early trials in Oak wilt chemotherapy.** *Abstr. in Phytopathology* 42 (1), 1952 (11).

Stem injections, subsurface soil applications and foliage sprays of several organic chemicals were applied to trees of various sizes of *Quercus borealis*, *Q. ellipsoidalis* and *Q. palustris*. Root-zone pressure applications of certain organic sulphurs, quaternary ammoniums, hydroxy quinolines, basic dyes and organic mercury compounds were the most effective against *Chalara quercina*. Field and greenhouse trials of 37 organic chemicals indicated that malachite green, Ca sulphamate, disodium ethylene bisdithiocarbamate, 8-hydroxy quinoline sulphate, Na dimethyl dithiocarbamate + Na 2-mercaptobenzothiazole, Na dimethyl dithiocarbamate, 8-hydroxy quinoline benzoate, phenyl mercuri triethanol NH_4 lactate, Na 2-mercaptobenzothiazole,

Na trichlorophenate, alkyl dimethyl ethyl benzyl NH_4Cl, and Cd succinate, sufficiently retarded the disease to warrant further investigation. The effectiveness of several chemicals from a variety of organic groupings suggests a mechanism general in action rather than specific. The preponderance of basic chemicals in the foregoing list also suggests that this action may be one of neutralizing the toxin, since in neutral and alkaline pH ranges the toxin produced by the Oak wilt fungus is inactive.

Cankers, Stem Rusts etc.

See also No. 4094.

3987. FOWLER, M. E. **Aircraft scouting for pole blight and Oak wilt.** *J. For.* 50 (3), 1952 (191–5). [Division of Forest Pathology, Beltsville, Md.]

The U.S. Division of Forest Pathology has now had several years' experience of aerial reconnaissance, and it is established that pole blight of White Pine and Oak wilt (caused by *Chalara quercina*) can both be spotted from the air. Since similar conditions may be caused by other factors, the diagnosis must be checked by ground observations. The spread and present extent of Oak wilt in the U.S.A. are summarized.

3988. GILL, L. S., LEAPHART, C. D., and ANDREWS, S. R. **Preliminary results of inoculations with a species of *Leptographium* on Western White Pine.** *For. Path. spec. Release U.S. Bur. Pl. Ind.* No. 35, 1951. pp. 14. 6 refs.

Some *Pinus monticola* of a size susceptible to pole blight were inoculated with a *Leptographium* (*Scopularia*) sp. isolated from diseased trees. Stem inoculations resulted in heavy resinosis similar to that associated with pole-blight cankers. [Cf. *For. Abstr.* 11 (No. 3284).]

3989. DENYER, W. B. G. ***Cephalosporium* canker of Western Hemlock.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (4).

A species of *Cephalosporium* was consistently isolated from cankers of young *Tsuga heterophylla* and produced cankers in young trees inoculated with it.

3990. GREGORY, P. H., and WALLER, S. ***Cryptostroma corticale* and sooty bark disease of Sycamore (*Acer pseudoplatanus*).** *Trans. Brit. mycol. Soc.* 34 (4), 1951 (579–97 + 3 plates). 18 refs. O.B.D.

Describes symptoms of the disease which was found in Essex in 1945 [cf. *For. Abstr.* 11 (No. 1465)] and the causal fungus. The fungus has been identified as the North American species *Coniosporium corticale*, which, because of certain characteristics of the stroma, conidiophores, and conidia, is now made into the type of a new genus *Cryptostroma*. Conclusive evidence of pathogenicity is lacking, but there is strong circumstantial evidence that the fungus is an aggressive parasite. Preliminary inoculation experiments suggest that it is normally spread by air-borne spores entering through wounds and broken ends of branches. It appears to be a new introduction into England. *From authors' summary.*

3991. BIRAGHI, A. **Probabili nuove possibilità per la lotta contro il cancro della corteccia del castagno. [A new possibility for the control of Chestnut blight [*Endothia parasitica*].]** *Monti e Boschi* 3 (4), 1952 (157–9). [It.f.e.]

Describes instances of canker in Chestnut coppice where the tree has reacted against the disease and isolated the infected area of bark by the formation of callus, and thus prevented its extension.

3992. KRSTIĆ, M. **Rak kostanjeve skorje v Sloveniji. [Chestnut blight in Slovenia.]** *Gozd. Vestn.* 9 (3), 1951 (54–60). 8 refs. [Sloven.croat.f.]

[Cf. *For. Abstr.* 13 (Nos. 439, 3117).] The infected Slovenian region, where ca. 1,000 trees of 40–60 years and great numbers of saplings are affected, is adjacent to the Italian province of Udine where the disease has already caused considerable damage. Control measures are suggested.

3993. VLOTEN, H. VAN. **Evidence of host-parasite relations by experiments with *Phomopsis pseudotsugae* Wilson.** *Scot. For.* 6 (2), 1952 (38–46). 14 refs.

Experiments in artificial inoculation of Japanese Larch with *P. pseudotsugae* confirmed the belief that the parasite can only attack the tree through wounds in the bark, and only during the dormant period. Inoculation during the growing season produced no pathological results. The apparently greater susceptibility of smooth-barked trees to infection is due not to greater inherent susceptibility, but to the fact that rough bark is more resistant to wounds. In the light of these findings it is held that brashing can safely be carried out in spring and summer. [Cf. *For. Abstr.* 10 (No. 2236).]

3994. SABET, K. A. **A discussion on the cause of the bacterial die-back and canker disease of Poplar.** *Ned. Boschb.-Tijdschr.* 24 (5), 1952 (126–9). 7 refs. [E.du.]

Briefly describes studies leading to the conclusion that *Pseudomonas syringae* f. sp. *populae* is responsible for bacterial dieback and canker of Poplar. Details of the studies will be published elsewhere.

3995. HEPTING, G. H., and CUMMINS, G. B. **A new species of *Peridermium* on Virginia Pine.** *Phytopathology* 42 (3), 1952 (115–6).

Cf. *For. Abstr.* 13 (No. 3118).

3996. MIELKE, J. L. **The rust fungus *Cronartium filamentosum* in Rocky Mountain Ponderosa Pine [*Pinus ponderosa* var. *scopulorum*].** *J. For.* 50 (5), 1952 (365–73). 16 refs.

Discusses history, taxonomy, spore production, size of trees attacked, effect on growth rate of Pine, rate of crown killing, and possible silvicultural control measures.

3997. **Control of rust disease on Ponderosa Pine.** *Rep. U.S. Bur. Pl. Ind. 1948/49*, 1949 (66).

Discovery that the combined rate of progress of the rust fungus, *Cronartium filamentosum*, up and down the trunks of infected Ponderosa Pines averages 1·2–2·4 ft./year has given foresters a measure for judging how soon such trees should be felled to avoid their loss. Logging of affected stands on a short cutting cycle is now being recommended. The investigation showed that the fungus spreads from the initially infected branch into the main

stem and from it into other branches, killing them twig by twig until the tree dies. Long before death, the growth of severely affected trees is greatly reduced. The rust produces no cankers or swellings, and in the main stem gives no visible indication of its presence, so that its rate of progress must be measured by an indirect method such as that developed in this investigation. Unlike most rusts, this species is commoner on old than on young trees.

Foliage Diseases

See also No. 3618.

3998. REICHERT, I., and CHORIN, M. **A rust disease of Aleppo Pines in Palestine.** *Palest. J. Bot. (R. Ser.)* 7 (1/2), 1949 (134–41 + 1 plate). 8 refs. E.M.B.

A needle rust of *Pinus halepensis* found in Palestine in 1946 was found to belong to a species of *Peridermium*. *Coleosporium* stages which may be associated with the Pine rust have been found on *Senecio vernalis*, *Inula viscosa* and *I. graveolens*. The symptoms of the rust and the fungi are described. The rust is a potential danger only in exceptional years. It is most serious on slopes with a W. or NW. exposure. *From authors' summary.*

3999. LAL, A., and TANDON, I. N. **A new species of *Gloeosporium* on *Anthocephalus cadamba*.** *Indian Phytopath.* 3 (2), 1950 (140–7). 2 refs. O.B.D.

A fungus attacking *A. cadamba* was found to be a new species of *Gloeosporium* and is named *G. anthocephali*. Characteristics of attack are leaf and twig spots, partial or complete defoliation, and die-back. Results of culture studies are presented.

4000. SCHULDT, P. H. **Anthracnose fungi on Sycamore [*Platanus occidentalis*] and Oak in Iowa.** *Abstr. of thesis*, in *Iowa St. Coll. J. Sci.* 26 (2), 1952 (279–80). O.R.E.

Reports studies on *Gnomonia veneta* and a closely related species which is provisionally referred to as *Gloeosporium quercinum* West.

4001. ENDE, G. VAN DEN. Een bladvlekkenziekte voorkomend op de populieren veroorzaakt door *Septotinia populiperda* Waterman and Cash. **[Leaf blotch of Poplars caused by *S. populiperda*.]** *Tijdschr. PlZiekt.* 58 (2), 1952 (54–9). 3 refs. [Du.e.] E.M.B.

The leaf blotch was found in a nursery at Hoog Keppel in 1950; damage was slight. The fungus is described, and Poplar species on which it has been found in the Netherlands are listed. [Cf. *For. Abstr.* 12 (No. 1580).]

444. VIRUS DISEASES

4002. WELLMAN, F. L., and GRANT, T. J. **An apparent virus disease of *Casuarina* in the American tropics.** *Plant Dis. Reptr.* 35 (11), 1951 (498–9). A.P.B.

Brooming of *C. equisetifolia* was first noticed in Costa Rica in 1947. It has also been found in Mexico and the Panama Canal zone. Examples from all these areas are described.

4003. **A new Walnut and Butternut virus disease.** *Rep. U.S. Bur. Pl. Ind. 1946/47*, 1947 (62).

The cause of a severe systemic brooming disease of Walnuts and Butternuts has been shown to be a virus which can be transferred by grafting.

4004. PERIŠIĆ, M. Nova virusna bolest na kanadskoj topoli kod nas. **[A new virus disease of 'Canadian' Poplar in Jugoslavia.]** *Šumarstvo* 4 (5), 1951 (313). 1 ref. [Serb.f.]

A virus disease, with symptoms similar to those described by Atanasoff, in *Phytopathologische Zeitschrift*, 8/2, 1935 (197–223), and found by him on the same species in Bulgaria, was observed on '*Populus canadensis* Moench. (*P. balsamifera*)' [?] in the parks and municipal plantations of Belgrade in 1950–1. The disease is characterized by the appearance, in June, of local loss of chlorophyll in leaves and by a distinct green-yellow chlorotic flecking, giving the diseased leaves a mottled appearance. The irregular chlorotic flecking in time turns yellow and then darkens. The diseased leaves fall prematurely.

45. DAMAGE BY ANIMALS

4005. CARVALHO, A. LEITÃO DE. **Contribuição ao estudo da biologia na Estação Florestal dos Pardos. [Biological notes made at the Estaçao Florestal dos Pardos.]** *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (208–22). 19 refs. [Port.e.]

Notes relating to this particular region on: (1) insects found on *Araucaria* sp.; (2) insects found on *Cedrela* sp., and (3) birds and mammals attacking *Araucaria* sp. A list of insect pests of *Araucaria* reported from the whole of Brazil is also included.

451. *Mammals*

See also Nos. 3582, 3591, 3736, 3796, 3854–5, 4005.

4006. MACDONALD, D. R. **Some observations on porcupine attacks on Jack Pine.** *Annual Ring* No. 5, 1952 (17–8).

Examination of half a square mile of Jack Pine type containing 56% Jack Pine showed that in terms of that species alone there was a mortality rate of 34% due to porcupine, and 5% due to other causes; only 33% of the trees were left untouched and the remaining 28% were attacked in various degrees. A classification of porcupine damage in terms of extent of scars, is given.

4007. WILLIAMSON, M. J. **Rabbits damage *Metasequoia* plantings at Beltsville, Md.** *Ntheast. Res. Notes Ntheast. For. Exp. Sta.* No. 12, 1952 (3–4).

Tabulated results showing height growth on different sites during 1951 suggest that *M. glyptostroboides* should be grown on fairly moist sites free of competing vegetation. Rabbit damage during the winter was heavy, but recovery was good.

4008. LUNDBERG, G. Älgskador på skog och deras praktiska förebyggande. **[Elk damage to the forest and its prevention in practice.]** *Skogen* 37 (9; 10), 1950 (185–87, 198; 212–3). [Sw.]

Concludes that elk damage can be reduced: (1) by shooting under licence in large forest areas to keep

herds at a level, higher on good than on poor sites, that the forest can stand; (2) by ensuring, so far as possible, that Pine regeneration, whether natural or planted, shall be dense, even-aged and covering a large area; (3) where regeneration covers smaller areas, by protecting the edges of the stand by spraying with deterrents or by hunting the herds away with dogs; (4) by encouraging where possible the growth of more attractive food, such as Rowan, Willows, and Birch and Aspen scrub; and (5) by encouraging Spruce regeneration in place of Pine on all suitable sites. [Cf. *For. Abstr.* 13 (No. 2280).]

4009. FLÜGEL, H. Wildverbissschutz im Forstamt Westerhof. [**Protection against damage by deer in the Westerhof forest district.**] *Forst u. Holz* 7 (6), 1952 (82–3). [G.]

Instructions and costs for making a home-made paint of lime and cow and pig manure, for protection against deer.

4010. GEISE, W. Ohlsens Fegeschutz D.G.M. [**Ohlsens tree-protector.**] *Forst u. Holz* 7 (7), 1952 (100). [G.]

This device for protecting the bark of trees from damage by deer consists of an upright wire 3·5 mm. in diameter and 90 cm. long, with 4 wire cross-pieces, 3 of which are 50 cm. and one 35 cm. long. The upright is planted firmly in the ground 5–7 cm. from the stem and the cross pieces are bent round the stem to protect it. When the stem outgrows the encircling wire, the wire is easily pushed apart without any damage being sustained by the tree. The cost of 100 such devices plus transport is DM12.

4011. FOOT, A. S., and LOVETT, J. F. **Electric fencing.** *Bull. Minist. Agric., Lond.* No. 147, 1951. pp. 25 + 9 photos. 6 refs.

Uses, equipment, erection and maintenance of electric fences in agriculture and forestry.

452. *Birds*

See No. 4005.

453. *Insects*

See also Nos. 3585 *et seq.*, 3751, 3786, 3937–9, 4005, 4072.

4012. Insectes nuisibles—Arrêté royal du 20 décembre 1951 relatif à la protection des biens boisés contre les insectes nuisibles. [**Harmful insects—royal decree of 20 Dec. 1951 on the protection of woodlands from harmful insects.**] *Bull. Soc. for. Belg.* 59 (4), 1952 (212–5). [F.]

Deals particularly with measures to control *Hylobius abietis*, *Ips typographus*, *Lymantria monacha* and *Diprion pini*. Owners are obliged to report heavy infestations and to remove infected trees.

4013. KOEHLER, W. Przyczyny powstawania i przebieg gradacji szkodliwych owadów leśnych. [**Causes and development of outbreaks of forest insect pests.**] *Prace Inst. Bad. Leśn.* No. 74, 1951. pp. 47. 22 refs. [Pol.]

A review of modern theories. Includes sections on: the biocoenosis, the 'iron reserve' and 'biological equilibrium'; attack and epidemic ('gradation'); mechanism of the development of outbreaks; features of their onset; areas affected; theories of the origin of outbreaks (parasite, biocoenotic, climatic, and 'overpopulation' theories); atmospheric factors, food, and natural enemies, and their effect on the rate of regeneration, the 'resistance of the environment', and on the population; the notion of 'gradocene' (Schwerdtfeger's variable complex of endogenic and exogenic factors, connected with the outbreak phenomena of a given species).

4014. GÖSSWALD, K. Über die ökologische Bereinigung von Schädlingsplagen im Walde mit Hilfe der roten Waldameise. [**The ecological control of insect pests in the forest with the help of *Formica rufa*.**] *Naturwissenschaften* 39 (5), 1952 (97–9). 19 refs. [G.] O.R.S.

Stresses the value of the wood ant in controlling insect damage, and discusses methods of protecting and increasing the colonies, by dividing existing colonies, by breeding queens for establishing new colonies and by setting up 'farms' to supply fish and bird food. [Cf. *For. Abstr.* 13 (No. 3140).]

4015. WEST, T. F., HARDY, J. E., and FORD, J. H. **Chemical control of insects.** Chapman & Hall Ltd., London. 1951. pp. xi + 211. 402 refs. Price 15*s*.

Contains sections on the main outlines of pest control, and the application of various chemical insecticides, repellents and attractants, as well as a section on (agricultural) weed control.

4016. **Common names insecticidal chemicals.** *Rep. U.S. Bur. Ent. 1949/50*, 1950 (56).

The U.S. Bureau of Entomology has indicated that it will use the following common names for four synthetic organic insecticides: *lindane* for the γ-isomer of benzene hexachloride of a purity not less than 99%; *aldrin* for a product containing not less than 95% of 1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4, 5, 8-dimethanonaphthalene; *dieldrin* for a product containing at least 85% of 1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-octahydro-1, 4, 5, 8-dimethanonaphthalene; and *allethrin* for the substantially pure chemical *dl*-2-allyl-4-hydroxy-3-methyl-2-cyclopenten-1-one esterified with a mixture of *cis* and *trans dl*-chrysanthemum monocarboxylic acids. [Cf. *For. Abstr.* 11 (No. 3277).]

4017. BORNEBUSCH, C. H. Insektgiftes indflydelse på jordbundsfaunaen. [**The effect of insecticides on the soil fauna.**] *Dansk Skovforen. Tidsskr.* 36 (7), 1951 (335–64). [Dan.]

Sample areas in a plantation of young Norway Spruce were dusted on 28 and 29 June 1949 with Gesarol (5% DDT) or Bladan (2% parathion) at rates corresponding to 20 kg./ha. Soil samples were taken on 4 and 13 July and a count was made of the soil fauna present. In the first samples, taken after a long drought, the total for all plots dusted with Gesarol was higher than that for controls, for plots treated with Bladan the figure was 85% of that for controls. The second samples were taken after heavy rain, which had washed the powder down. The total fauna in the Gesarol-treated sample amounted to 59%, and in the Bladan to 41·4%, of that for controls.

4018. MATTHYSE, J. G., and CLOWER, D. **Factors involved in injury by mist blower DDT formulations.** *Proc. nat. Shade Tree Conf. 1951* (112–28). 9 refs.

Injury to American Elm by properly conducted mist-blower treatment is unusual and usually the result of severe over-dosage. Kerosene is a fairly safe oil carrier but there are several less injurious oils produced commercially. Xylene and xylene-type volatile aromatics are among the least injurious solvents. Use of aromatic, less volatile, petroleum solvents, including methylated naphthalenes, causes far greater injury. Young, fully opened foliage is the most susceptible. The undersides of leaves are more susceptible to injury than the upper sides. Applications made just before dark appear to produce far less injury than applications during full daylight. The addition of Aramite and Ovotran to spray is harmless, but Dimite causes considerably greater toxicity to leaves.

4019. SIMKOVER, H. G., and SHENEFELT, R. D. **Phytotoxicity of some insecticides to coniferous seedlings with particular reference to benzene hexachloride.** *J. econ. Ent.* 45 (1), 1952 (11–5). 11 refs.

Several compounds giving effective white-grub control were tested in the greenhouse, laboratory and field for phytotoxicity. Cytological and anatomical abnormalities were established in root tips of *Pinus resinosa* planted in sand treated with 1 lb. γBHC/acre. Crude BHC at 1 p.p.m. in solution or 8 oz./acre γBHC in white sand, were enough to incite root malformation. Of various isomers, impurities and breakdown by-products of BHC, tested as vapours and in solution, the most injurious proved to be the trichlorobenzene breakdown products. When 2·4% (by weight) of organic matter was added to white sand treated with 1 lb./acre γBHC, the phytotoxic effects were eliminated. Chlordane was non-toxic to 20 species of conifer, including *P. resinosa*.

Isoptera

See No. 4352.

Hemiptera

See also No. 3585.

4020. BODENSTEIN, G. Ein Freiland-Massenvorkommen von *Trialeurodes vaporariorum* Westw. [**An outbreak of *T. vaporariorum* in the open.**] *Anz. Schädlingsk.* 25 (4), 1952 (57–9). [G.]

Presents an alphabetical list of cultivated and wild plants attacked in the open by *T. vaporariorum* during an outbreak at Ingelheim in 1951. It includes a number of tree species.

4021. CHRYSTAL, R. N. **Douglas Fir *Adelges*.** *Rep. imp. For. Inst. Oxf. 1950'51*, 1952 (16).

Further observations of pruned and unpruned strips [cf. *For. Abstr.* 11 (No. 3338)] showed that after 3 years the two sets of trees were very similar in height and girth growth although the unpruned trees carried a considerably larger *Adelges* population over the period. The evidence so far collected suggests that a considerably larger *Adelges* population than has been encountered in the field would be required to produce a 'checked' condition in Douglas Fir that had reached the later thicket stage, and no checked condition ascribable to *Adelges* has so far been observed on trees up to a height of 5–6 ft. Experimental trees of this size artificially infected with a heavy population of *Adelges* have retained equal vigour with control trees kept free of infection.

4022. BALCH, R. E. **Studies of the Balsam woolly aphid, *Adelges piceae* (Ratz.) and its effects on Balsam Fir, *Abies balsamea* (L.) Mill.** *Publ. Dep. Agric. Can.* No. 867, 1952. pp. 76. 47 refs.

A comprehensive study covering biology, seasonal history and life history, habits and behaviour of sistentes, natural control, effect on the tree, effect on the stand, and control.

4023. BRADLEY, G. A. **Caragana aphid.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (3).

Control of *Macrosiphum caraganae* on *Caragana arborescens* was obtained by spraying with parathion 25% wettable powder, or with TEPP 40% emulsifiable concentrate; DDT was ineffective.

Lepidoptera

See also Nos. 3587–9, 3819, 4012.

4024. HENSON, W. R., and SHEPHERD, R. F. **The effects of radiation on the habitat temperatures of the Lodgepole needle miner, *Recurvaria milleri* Busck (Gelechiidae: Lepidoptera).** *Canad. J. Zool.* 30 (2), 1952 (144–53). 4 refs. P.R.

4025. STARK, R. W. **Lodgepole needle miner.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (3).

In order to obtain a sampling error of 10%, 35 trees had to be sampled at valley bottom, 25 at 750-ft. level, and 25–30 at 1,500-ft. level. There is a significant difference in infestation at the different levels.

4026. **Arborvitae leaf miner (*Argyresthia* spp. and *Recurvaria thujaella*).** [*Bienn.*] *Rep. Me. For. Comm. 1949–50*, 1951 (88–91).

Experiments showed that though spraying with DDT killed a high percentage of leaf-miners, it was less effective than nicotine-sulphate spray and moreover led to a serious mite infestation.

4027. WEBB, F. E. **The Larch casebearer [*Coleophora laricella*] in the Maritime Provinces and Great Lakes Region.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (1).

A general account of epidemiology and natural control.

4028. LEVER, R. J. A. W. **A Malayan leaf-tying caterpillar from Mangroves periodically submerged in sea-water.** *Ent. mon. Mag.* 88 (1055), 1952 (95).

Larvae of a species of *Argyroploce* were found feeding on the leaves of *Sonneratia griffithii* at Port Dickson, Negri-Sembilan. The larvae, which weave a not very dense web, were on twigs of young Mangrove covered with sea water at high tide, and appeared to make no attempt to avoid immersion. When specimens were covered with sea water for

4½ hours in the laboratory, they were active and feeding normally some hours after the water had been drained off. Details of the life history of the moth have not yet been established.

4029. RADCLIFFE, D. N. **Seed loss due to the Douglas-Fir cone moth [*Barbara colfaxiana*.]** *Bim. Progr. Rep. Div..For. Biol. Dep. Agric. Can.* 8 (1), 1952 (3).

Damaged cones produce only 41·5% as much seed as sound ones, and many of the apparently sound seeds in damaged cones failed to germinate.

4030. FITZE, K. *Laspeyresia strobilella* L. (Smotavac omorovih šišarica). [*L. strobilella.*] [Publ.] *Inst. nauč. Istraž., Sarajevo* No. 1, 1951. pp. 17. [Croat.g.f.]

The morphology and life cycle of *L. strobilella* are described, in connexion with the appearance of this pest in cones of *Picea abies* in the Klekovača district of Bosnia-Herzegovina, in 1950. Some cones contained as many as 20 larvae.

4031. BLAIS, J. R. **The relationship of the Spruce budworm (*Choristoneura fumiferana*, Clem.) to the flowering condition of Balsam Fir (*Abies balsamea* (L.) Mill.).** *Canad. J. Zool.* 30 (1), 1952 (1–29 + 4 photos). 11 refs. P.R.

Populations of the Spruce budworm were studied on flowering and non-flowering Balsam Fir trees. Generally more eggs were found on the former, which also harboured higher populations in the early larval stages owing to the presence of staminate flowers and flower cups. The behaviour of the larvae in relation to these was studied in both field and laboratory. Larvae that fed partially on pollen developed more rapidly than larvae feeding exclusively on foliage. Pollen as a food did not appear to have any direct effect on survival or fecundity. Other experiments showed that mortality was higher, development retarded, and fecundity reduced in insects forced to feed on old foliage in contrast with those fed on the current year's growth. Defoliation was more severe on flowering trees in the earlier stages of the infestation. However, as populations increased, wandering increased owing to competition for food. This resulted in an overflow of larvae from flowering to non-flowering trees. [Cf. *For. Abstr.* 12 (Nos. 1617–8).] *From author's summary.*

4032. MITCHELL, R. T. **Consumption of Spruce budworms by birds in a Maine Spruce/Fir forest.** *J. For.* 50 (5), 1952 (387–9).

4033. FRANZ, J. M. **Observations on collecting parasites of *Cacoecia histrionana* (Froel.) (Lep., Tortricidae).** *Bull. ent. Res.* 43 (1), 1952 (1–19 + 3 plates). 17 refs.

A report on the work of the Commonwealth Institute of Biological Control during 1948 and 1949 in attempting to find European parasites of *Cacoecia histrionana* which might be of use in controlling Spruce budworm outbreaks in North America. In the 1949 investigations the insect was found in abundance on the north-eastern frontier of Bavaria, but not elsewhere. Some biological details based on observations in this region are presented. An important characteristic is the great variation in the stages of larval development present at any given time. Approximately 4° C. was found to be the lower temperature limit for movement and feeding of larvae ready for overwintering. An estimate was made of the minimum population in a limited area. From the *C. histrionana* larvae collected, 15 species of primary parasites and 4 of hyperparasites were bred. From the results of three samples taken at different times, the minimum reduction of the population after hibernation is calculated to be 66·8%. The most important larval parasite was *Meteorus ruficeps*, which completes 2–3 generations in one host generation. A proportion of the population overwinters in other Microlepidoptera, concentrating on *C. histrionana* in summer. Some larvae die of disease, but disease was of little consequence as a mortality factor in the observation area in 1949. The mortality caused by parasites proved to be very important in affecting changes of population density. [Cf. *For. Abstr.* 11 (Nos. 488, 1489); 12 (No. 2454).] *From author's summary.*

4034. DAVIAULT, L. **Les parasites de la tordeuse des bourgeons de l'épinette (*Choristoneura fumiferana* Clem.) dans la province de Québec. [Insect parasites of the Spruce budworm in Quebec.]** *Rep. Quebec Soc. Prot. Pl. 1948/49*, 1950 (41–5). [F.]

The commonest and most active parasites recovered were *Apanteles fumiferanae*, *Glypta fumiferanae*, *Meteorus trachynotus*, *Itoplectis conquisitor*, *Phryxe pecosensis* and *Aplomyia caesar*.

4035. HOUSE, H. L. **Notes on the laboratory propagation of *Pseudosarcophaga affinis* (Fall.), a sarcophagid parasite of the Spruce budworm, *Choristoneura fumiferana* (Clem.).** *Rep. Quebec Soc. Prot. Pl. 1948/49*, 1950 (134–7). 3 refs.

4036. Un problème de conservation: la protection des forêts. [A conservation problem: forest protection.] Action sociale Ltée., Quebec. 1951. pp. 58. [F.E.]

Contains the following papers presented to the annual meeting of the Association des Ingénieurs forestiers de la Province de Québec in Nov. 1951. (1) Forest fires in Quebec: (*a*) Losses (*G. Paquet*), (*b*) Causes (*R. Martineau* and *O. Villeneuve*), (*c*) Remedies (*F. Boutin*); (2) Experimental airplane spraying for budworm control, Quebec, 1951 (*W. E. Waters*). (1) is in French, (2) in English.

Paper (2) is primarily a report of an intensive spraying experiment for Spruce-budworm control, conducted during June 1951 near Bagotville, Quebec. The following information was obtained from the experiment: (i) 1 lb. DDT in 1 gal. spray solution/acre is the minimum dosage for effective control. (ii) A medium-fine spray was the most consistently effective—budworm mortality of 95% was obtained by this degree of atomization with both 1-lb. and ½-lb. dosages. The very fine spray gave the most variable deposit and cannot be recommended. (iii) Application of the spray when the budworm is in the later larval stages is more effective than earlier applications. The DDT deposit necessary to effect high control with the medium spray at this time is quite low—less than 0·2 lb./acre. (iv) It was clear that, even when properly timed, uniform coverage by the spray is the critical factor in obtaining a high degree of control.

4037. CHIARELLI DE GAHAN, A. El bicho quemador. [*Hylesia nigricans*.] *Alm. Minist. Agric. Argent.* 26/27, 1951/52 (139–42). [Span.] A.P.B.

Describes the stages of *H. nigricans*, an important pest of fruit, ornamental and forest trees throughout southern Argentina. Mechanical control, i.e. destruction of the cocoons, or cutting and burning infested branches, is best, but dusting with Pb arsenate is effective on newly emerged larvae. Tanglefoot bands also reduce the spread of infestation.

4038. SCHIMITSCHEK, E. Der amerikanische Webebär, *Hyphantria cunea* Drury in Österreich. [*H. cunea* in Austria.] *Anz. Schädlingsk.* 25 (4), 1952 (49–52). 6 refs. [G.]

Traces the history of the insect's spread from Hungary into Austria, with some details of its biology and life history, and brief notes on control.

4039. GOES, E. DA S. REIS. Estudo dos depredadores e parasitas da *Lymantria dispar* L. [Study of the predators and parasites of *L. dispar*.] *Publ. Serv. flor. aqüic. Portugal* 15 (1/2), 1948 (63–90 + 2 plates). 17 refs. [Port.e.]

The Portuguese Commission for the Control of Gypsy Moth, which was appointed in 1945, undertook, among other things, a thorough revision of the inventory of parasites and predators, along with studies of their biology, range and importance. A list of predators and parasites, with descriptions, is presented. Of the egg predators the most important are *Dermestes lardarius*, *Trogoderma versicolor* and *Anthrenus minutus*, and of the larval predators, *Calosoma sycophanta*. The only known egg parasites are *Schedius kuvanae* and *Anastatus disparis*. The former, an exotic species originating in Japan, was introduced into Portugal in 1932 and has now spread over all the Cork Oak area south of the Tagus, where it produces 7 generations in 1 year and destroys 25% of eggs. *A. disparis* is a native species, which produces 2 generations per year. The degree of parasitization ranges between 2 and 35%. The most important larval parasites are *Apanteles melanoscelus* and *Compsilura concinnata*. *A. melanoscelus* destroys more than 40% of the larvae and produces 1 or 2 generations in spring and 1 in autumn which hibernates. The only pupal parasite obtained was *Brachymeria intermedia*. In certain areas this is very abundant, with a degree of parasitization of over 90%.

4040. KAFOL, A. Iz zgodovine pinijevega sprevodnega prelca pri nas. [The history of *Thaumetopoea pityocampa* in Slovenia.] *Gozd. Vestn.* 9 (10), 1951 (243–6). [Sloven.]

[Cf. *For. Abstr.* 13 (No. 3176).] In February 1930, the author observed, after a fortnight of blizzards when the temperature often fell to – 25 to – 29° C., nests with living larvae of *T. pityocampa*. A fortnight later, he saw a procession of larvae in a place where no nests could be found; it was later established that these larvae came from nests on a broken branch carried there by the blizzard. A cold and dry winter does not harm the larvae, but a wet winter does. Jays, woodpeckers, chaffinches, and sparrows have been seen to eat larvae out of the nests, while the nightjar is the main predator of the (nocturnal) imagos.

Coleoptera

See also Nos. 3586, 3834, 3976, 3979, 4012, 4350–1.

4041. ERDEM, R. Türkiyede yeni bir kavak kültür tahripçisi *Cryptorrhynchus lapathi* L. [*C. lapathi* as a new pest of Poplar [*Populus 'canadensis'*] stands in Turkey.] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (2), 1951 (111–4 + 2 photos). [Turk.g.]

4042. **The large Pine weevil (*Hylobius abietis*).** *Leafl. For. Comm., Lond.* No. 1 (revised) 1952. pp. 7. Price 6*d*.

4043. SCHINDLER, U. Ein- oder zweimalige Spritzung gegen den grossen braunen Rüsselkäfer (*Hylobius abietis* L.)? [Single or repeated spraying in the control of *H. abietis*?] *Forst u. Holz* 7 (8), 1952 (108–11). 7 refs. [G.g.] [Niedersächsische Forstliche Versuchsanstalt, Sieber/Harz.]

Permanence tests of various DDT sprays showed that a single spraying with 1% Diditan 50 or with 0·5% or 1% Diditan Ultra gives adequate protection for 4 months, i.e. against both spring and summer attacks. Diditan Ultra is preferable because of its better adhesive qualities.

4044. **Pales weevil (*Hylobius pales*).** [*Bienn.*] *Rep. Me. For. Comm. 1949–50*, 1951 (98–100).

Results of planting on experimental plots to determine the incidence of *H. pales*, showed that: (1) plantations of White Pine, Red Pine, and Norway Spruce should not be started on cut-over or burned-over Red, White, or Pitch Pine areas until autumn of the third year after cutting or burning; (2) losses may amount to 76% for White Pine, 68% for Red Pine, and 52% for Norway Spruce, with average figures of 50, 51, and 18% respectively; (3) about half the loss occurs in the first, rather less than half in the second, and only a small % in the third year. [Cf. *For. Abstr.* 11 (Nos. 1491–2).]

4045. ***Pissodes* weevils.** *Leafl. For. Comm., Lond.* No. 29, 1952. pp. 11. Price 6*d*.

4046. HADLEY, B. L. **Lead arsenate sprays to control White Pine weevil [*Pissodes strobi*].** *Pa. For. Wat.* 4 (1), 1952 (10–2, 23). 4 refs.

Cf. *For. Abstr.* 13 (No. 1388).

4047. SIMPSON, L. J. **Control of White-Pine weevil [*Pissodes strobi*] with DDT.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (1).

Further experiments have confirmed the preliminary findings [cf. *For. Abstr.* 11 (No. 718)] of the efficacy of DDT against this pest. Complete protection can be given to individual trees by spraying the leaders only, in the last week of April. Treatment must be repeated each year.

4048. RANDALL, A. P. **Chemical control of bark-beetles in Lodgepole Pine.** *Bi-m. Progr. Rep. Div, For. Biol. Dep. Agric. Can.* 8 (1), 1952 (3–4).

From the accumulated data obtained from field and laboratory experiments the following facts became evident. Chlordane and DDT gave consistently higher mortality of *Dendroctonus monticolae*

than did $EtBr_2$ or orthodichlorobenzene at corresponding concentrations. They also exhibited residual toxicity which resulted in a higher total mortality of the *D. monticolae* progeny. It was also noted that DDT and chlordane gave excellent control of *Ips interpunctatus* and *Pityogenes carinulatus* adults, but poor results against the larvae and pupae. A field experiment was also initiated, using the systemic poisons Systox and Pestox III, to determine the feasibility of controlling *D. monticolae*. Details of the analysis will not be known until next spring, but preliminary laboratory tests indicate that both poisons are toxic to *D. monticolae* and *I. interpunctatus*.

4049. PERRY, J. P. **Pine bark beetles of Central Mexico.** *Unasylva* 5 (4), 1951 (158–65).

Describes a serious outbreak of barkbeetles in *Pinus leiophylla* stands, together with life history of the principal species, *Dendroctonus mexicanus*, and an important secondary pest, *Ips bonanseai*. Control measures are discussed.

4050. MARTINEK, V. Pokusy s bojem proti kůrovci (*Ips typographus* L.) poprašováním lapáku insekticidy. **[Trials in the control of *I. typographus* by dusting trap logs with insecticides.]** *Lesn. Práce* 31 (1), 1952 (17–26). [Cz.cz.]

Presents the results of field and laboratory tests on the efficacy of Gesarol (DDT) and BHC against *I. typographus*. BHC proved more efficacious (100% kill after 3 days) than Gesarol (9 days) when the beetles were fed on bark dusted with the insecticide in amounts equivalent to 5 or 10 g. per sq.m. of bark. In the field experiments (April–September 1951) only BHC was used, dusted at a rate estimated to leave 5 g./sq. m. on the bark of tree-length trap logs. Results were encouraging, and the method is recommended as a supplementary measure for use during the swarming period.

4051. ANDROIĆ, M. Novi štetnik na borovima u Hrv. Primorju i Istri, *Pityogenes trepanatus* Noerdl. **[A new Pine pest on the Croatian littoral and in Istria, *P. trepanatus*.]** *Šum. List* 75 (12), 1951 (396–9). [Croat.f.]

In spring 1951, over 1,000 stems of *Pinus nigra* on an area of 150 ha. were seriously attacked by *P. trepanatus*. It was found that this insect has not less than 2, and possibly even 3, generations per year. Larvae and imagos were found in March in Pine twigs; there followed in May a new invasion, and in mid-September imagos were found under the bark. A tentative control method, using 'trapbranchwood', is described in some detail.

4052. VITAL, A. F. Um caso interessante de simbiose entre *Stysanus microsporus* Sacc. e *Platypus difficilis* Chapp. sôbre *Eschweilera luschnatii* Milrs. **[An interesting case of symbiosis between *S. microsporus* and *P. difficilis* on *E. luschnatii*.]** *Bol. Sec. Agric. Ind. Com., Pernambuco* 18 (3/4), 1951 (177–9). [Port.e.]

Cultures were made of the fungus associated with the ambrosia beetle *Platypus difficilis*: it is described and the nature of the symbiotic association between the borer and the fungus discussed.

4053. DOMINIK, J. Próba zwalczania pędraków guniaka-czerwczyka za pomocą preparatów chemicznych. **[An attempt at controlling *Amphimallon solstitialis* larvae by means of chemical preparations.]** *Sylwan* 96 (1), 1952 (111–6). [Pol.]

Owing to local conditions (delayed swarming, small incidence), the tests on the efficacy of BHC and DDT against *Melolontha vulgaris* larvae proposed for 1951, were given up, and similar tests on *A. solstitialis* were carried out. It was found that plants whose roots were dusted or sprayed before planting with a 5% preparation of BHC or DDT or their mixture, were immune to *A. solstitialis* larvae. No protection was obtained when BHC was put into soil cracks in the closest proximity to the plants; neither did Na_2SiF_6 give positive results.

4054. BURGDORFER, H. Die Waldmaikäferbekämpfung im Bienwald 1951. **[Cockchafer control in the Bienwald, 1951.]** *Allg. Forstzeitschr.* 7 (11), 1952 (124–7). 6 refs. [G.]

Gives a general description of the campaign against adults of *Melolontha hippocastani* in the flight period 2–22 May, using three BHC preparations and a BHC/DDT mixture applied by power dusters. The chafer population is considered to have been reduced to below the danger level for the period until the next flight (1955), when a possibly smaller-scale campaign will be needed. Costs are indicated. It is stressed that in the long run silvicultural control, by securing closed canopy in the breeding areas, is the key to the problem.

4055. HAMMOND, G. H. **Residual values of certain insecticides against adults and larvae of *Phyllophaga* spp. (A progress report.)** *Sci. Agric.* 32 (3), 1952 (143–9). 3 refs. O.R.E.

An application of 20 lb./acre of γ-BHC to pasture, eliminated larvae of *Phyllophaga* spp. in the first year. DDT, chlordane, aldrin and dieldrin need higher rates of application but may be used where tainting of crops is to be avoided.

4056. HAMBLETON, E. J., and MCCLURE, F. A. **Rhinocerus beetle, *Podischnus agenor* (Ol.) damages Bamboo shoots.** *Turrialba* 1 (4), 1951 (199–201). 4 refs.

In 3 localities in Guatemala ♂ and ♀ adults were found burrowing in young Bamboo shoots. The hosts were *Bambusa vulgaris* and *Gigantochloa apus*. The beetle is already known as a pest of sugar cane in parts of Central and South America, but little information exists about its biology and control. Hand picking of the adults is the most usual control method, though the author suggests that, in cases of severe infestation, good results might be obtained by introducing the giant Surinam toad, *Bufo marinus*, which has successfully reduced the sugarcane beetle in Puerto Rico.

Hymenoptera

See also Nos. 3588, 3590, 4012.

4057. HADLINGTON, P. **The Siricid wood wasps.** *Aust. Timb. J.* 17 (12), 1952 (890...5).

Includes information on the life cycle and general characteristics, records of the introduction of *Urocerus* and *Sirex* spp. and of a parasite,

Megarhyssa sp., through the port of Sydney, and possible control measures in Pine plantations if the woodwasps become established. [Cf. *For. Abstr.* 13 (Nos. 4347–9).]

4058. HARTIGAN, D. T. **Fungus associated symbiotically with *Sirex noctilio*.** *Aust. Timb. J.* 17 (12), 1952 (896).

A brief account of the fungus (resembling *Stereum sanguinolentum*) associated with *S. noctilio* and its effect on the tree. [Cf. *For. Abstr.* 11 (No. 721).]

4059. KOEHLER, W. **Próba zastosowania insektycydów kontaktowych w zwalczaniu osnui gwiaździstej. [A trial of contact insecticides for the control of *Acantholyda nemoralis*.]** *Sylwan* 96 (1), 1952 (100–10). [Pol.]

Presents the results of tests in Poland, since 1948, of the following contact insecticides in place of $Ca_3(AsO_4)_2$: (1)' Bentox', containing 5% of BHC (of which 12% was the γ-isomer); (2) a 10% DDT preparation, and (3) 'Duolit', a 10% mixture of DDT and BHC. Field tests on eggs of *A. nemoralis* gave negative results for quantities up to 30 kg./ha. of (1) and (2), while laboratory tests showed an efficiency of 11·6% and 39% for the proportions of 10 and 30 kg./ha. respectively of (1), and an efficiency of 79 and 97·5% for the same proportions of (2). The efficiency against larvae is better, viz. 99 and 96% for (1) and (2), respectively, when used in quantities of ca. 25 kg./ha. (laboratory tests). Field tests have shown that DDT preparations are very efficient in the control of the young instars (not above the 3rd), while BHC is ineffective. DDT ought to be applied between the hatching of larvae and their 2nd moulting, a period not exceeding 10 days.

4060. VIETINGHOFF-RIESCH, A. FRHR. VON. **Die Bedeutung des Schwarzwildes bei Gradationen forstschädlicher Insekten, mit einer Analyse seiner Tätigkeit bei einer Massenvermehrung der Fichtenblattwespe *Cephaleia abietis* L. im Niedersächsischen Forstamt Seesen II während der Jahre 1950/51. [The influence of wild boar on the population trends of forest insect pests, with an analysis of their activity during an outbreak of *C. abietis* in the forest district Seesen II, lower Saxony, in 1950–1.]** *Forstwiss. Cbl.* 71 (1/2), 1952 (29–47). 32 refs. [G.]

Discusses, on the basis of past records, the part played by wild boar in controlling forest pests, and presents the results of investigations in lower Saxony, where the influence of wild boar was studied upon populations of *Cephaleia abietis* in a 120-year-old Spruce stand. It was calculated that the wild boar reduced the number of insects by ca. 26%. The author maintains that their importance in the control of mass outbreaks is liable to be overestimated. [Cf. *For. Abstr.* 13 (Nos. 3142–3).]

4061. SCHREAD, J. C. **Birch leaf miner control.** *Circ. Conn. agric. Exp. Sta.* No. 182, 1952. pp. 5.

Successful control of *Fenusa pusilla* on Gray Birch has been obtained by spraying with 25% lindane emulsion at a rate of 1 pint/100 gal. water.

4062. MARTINEK, V. **Význam parasitace zlatěnky druhu *Cleptes semiauratus* L. při potírání kalamitního výskytu pilatky *Pachynematus scutellatus* Htg. u nás v roce 1950. [Importance of the parasitism of *C. semiauratus* in combating the 1950 outbreak of *P. scutellatus* in Bohemia.]** *Lesn. Práce* 30 (2), 1951 (141–5). 10 refs. [Cz.cz.russ.]

On the average, 5·86% of intact cocoons were parasitized by *C. semiauratus*; other parasites were responsible for only 1·20%.

4063. VIRNIK, F. **Smrekova grizlica in naše izkusnje z njo. [*Pristiphora abietina* and our experience with it.]** *Gozd. Vestn.* 9 (9), 1951 (209–20). 4 refs. [Sloven.g.]

Discusses various methods of control. Two experiments with powdery slaked lime ($Ca(OH)_2$) applied at a rate of 1 ton/ha. have given negative results. Spraying of trees with various liquids (paraffin emulsion, lime 'milk', 'wood carbolineum', tobacco extract) has proved inefficient or impracticable. In 1936, experiments were conducted by the Entomological Laboratory of the Faculty of Agriculture and Forestry in Zagreb on control by dusting insecticides from aircraft, and also with motor, back, or hand sprayers. Best results were obtained with stomach poisons (Ca arsenates), particularly with the preparation 'Bohumin' (over 3 million larvae/ha. destroyed); contact poisons were much less effective. The author believes that the only rational way of dealing with this pest is to substitute mixed stands for pure Spruce stands up to the 500-m. level. [Cf. *For. Abstr.* 12 (No. 3453).]

4064. HUSSEY, N. W. **New records of *Megastigmus* (Hymenoptera, Chalcididae) in Scotland, with a note on the first recorded parasites of *Megastigmus spermotrophus* Wachtl.** *Scot. For.* 6 (2), 1952 (53–5). 4 refs.

4065. OTAMENDI, J. C. **Las hormigas podadoras del Brasil—informe sobre una gira de estudio. [The leafcutter ants of Brazil—report on a tour of investigation.]** [*Publ.*] *Inst. Sanid. veg. Argent.* (*Ser.B*) 3 (10), 1947. pp. 48. [Span.]

Presents information on the methods and equipment used in Brazil for the chemical control of leafcutter ants, with particular reference to *Atta* spp., discusses the importance of organizing a permanent control service in Argentina, and describes methods of raising *Atta* spp. and *Acromyrmex* spp. in the laboratory.

Diptera

See also No. 3586.

4066. KÜSTER, E. **Über die morphologischen Kennzeichen der Gallen von *Dasyneura crataegi*. [The morphology of galls of *D. crataegi*.]** *Ber. dtsch. bot. Ges.* 64 (9), 1951 (283–7). 11 refs. [G.] O.B.D.

4067. JENSEN, P. B. **Untersuchungen über die Bildung der Galle von *Mikiola fagi*. [Research on the formation of galls by *M. fagi*.]** *Biologiske Meddelelser, Kongelige Danske Videnskabernes Selskab, København* 18 (18), 1952. pp. 18. 3 refs. [G.e.] [Pflanzenphysiologisches Laboratorium der Universität, Copenhagen.] O.R.S.

Further experiments [cf. *For. Abstr.* 10 (No. 81)] show that if part of the gall is made inaccessible or

if the bottom of a newly formed gall is cut, the larva can regulate the distribution of growth substances to produce a localized growth.

459. *Other Animals*

4068. URQUHART, B. **Slugs and natural regeneration.** *Quart. J. For.* 46 (2), 1952 (110–2).

Damage to both Beech and Sycamore [*Acer pseudoplatanus*] seedlings by various species of slug has been observed and may account for the high proportion of deaths among 1-year-old seedlings of broadleaved species. Natural predators, especially hedgehogs, should be encouraged.

46. DAMAGE TO TREE GROWTH BY MAN

See also No. 3583.

4069. SEREVO, T. S. **Some observations on the effects of different methods of logging on residual stand and on natural reproduction.** *Philipp. J. For.* 6 (4), 1952 (363–81). 16 refs.

Observation of a number of sites in the Philippines after tractor or high-lead donkey logging showed that much of the advance growth had been injured, and that Dipterocarp reproduction did not often survive exposure; its place was taken by secondary, light-demanding species.

4070. JORDAN, H. Ertragsrückgang und Bodenentartung infolge Grundwasserabsenkung. [**Decline in yield and degeneration of the soil following a lowering of the watertable.**] *Forstwiss. Cbl.* 70 (12), 1951 (747–54). 2 refs. [G.]

A report on changes in the soils and in the composition and quality of the forests brought about through drainage operations north of Karlsruhe/Baden, with some recommendations for improvement of the forests.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also Nos. 3987–8.

4071. IBBERSON, J. E., and STREATER, H. **White Pine blight responds to fertilizer applications.** *Pa. For. Wat.* 4 (2), 1952 (30–1, 46). 3 refs.

White Pine blight, a disease of unknown origin [cf. *For. Abstr.* 11 (No. 743)] occurs on *Pinus strobus* of all ages, from Canada to Georgia. An experiment has been started in Cook Forest, Pennsylvania, to test the response of diseased trees to various fertilizer treatments. The disease appeared to respond very definitely and rapidly to applications of complete fertilizer (10–6–4) at a rate of 1 or 2 lb. per in. d.b.h.; 3 lb./in. d.b.h. was apparently an overdose and had a toxic effect on the trees. The next best response was obtained by applications of 1 lb. $Ca(OH)_2$/in. d.b.h., but this stimulation would probably soon wane, and applications of balanced fertilizer over a period of time should prove more effective. None of the applications of trace elements gave positive results.

4072. MORRIS, R. F. **Tree injection experiments in the study of Birch dieback.** *For. Chron.* 27 (4), 1951 (313–29). 15 refs. [Dominion Entomological Laboratory, Fredericton, N.B.]

Experiments were carried out in New Brunswick in 1943–4 to determine whether tree injection techniques would be useful for diagnostic purposes in determining the causes of Birch dieback. Injection techniques were tested for 3 purposes: (1) the injection of nutrient solutions to determine whether initial symptoms of dieback are associated with nutrient deficiencies. (2) The injection of insecticides to kill larvae of *Agrilus anxius* without killing the tree, and thus to determine whether dieback can progress to advanced stages in the absence of borer damage. (3) The injection of tree poisons to determine the survival of borer populations in killed trees. Of the 266 trees described (White Birch) 179 were injected and the others were controls: they were of roughly the same size—33 ft. high, 4 in. d.b.h., 11 ft. crown height, and 4·2 ft. mean crown width.

As an injected chemical was transported up through the xylem, lateral distribution was tangentially inwards. Injection through one shallow radial hole ensured encirclement inside the xylem within a height of 10 ft., and consequent distribution throughout the crown, and was therefore satisfactory for injection of nutrients or tree poisons. Since, however, the tangential distribution was also inwards, the use of two tangential holes in the outer part of the xylem failed to distribute insecticides adequately in the cambial region where *Agrilus* larvae are usually found. It was found that solutions could not be injected through the roots or through holes that failed to penetrate the xylem of the stem.

The tolerance of Birch (some Yellow, as well as White) to nutrient salts was related to the weight of salt injected; the concentration of the solution did not affect the leaf injury resulting from over-doses, but concentrations over 4% often killed a strip of cambium above the injection hole. The maximum tolerated dose varied with weather and condition of the tree. About 40 g. of a salt containing N, K, or P was the maximum that could be safely injected in dry weather. Injection of the maximum tolerated dose of these salts into trees showing initial symptoms of dieback, produced no observable improvement in foliage colour or radial growth in the current or following years. It is concluded that either these amounts are too small to affect the crown or deficiency in the 3 common elements is not a factor in dieback.

Birch was found to be rather tolerant to nicotine but very intolerant to cyanide. Although new systemic insecticides offer possibilities, it is suggested that external applications of DDT are likely to present a more practical method for preventing borer attack in diagnostic work. A close relationship exists between the survival of borer larvae and the condition of the tree. As a result of this, it is possible to poison trees in silvicultural stand improvement in such a way that borer attack and multiplication are prevented, or to make the poisoned trees serve as trap trees. *From author's summary.*

4073. Møller, C. M. Træmålings- og tilvækstlære. { [A textbook of] **forest mensuration and increment determination.**] Kgl. Veterinær- og Landbohøjskole (printed by Kandrup & Wunsch), Copenhagen. 1951. pp. 332. Many refs. [Dan.]

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

See also No. 3556.

521. *Diameter (Girth) and Sectional Area*

See also No. 4102.

4074. Kidd, W. J. **A small-tree diameter gage.** *J. For.* 50 (3), 1952 (220–1).

Describes a small, easily made aluminium gauge for measuring the diameter of young trees up to 4 in. in diameter. It is light and easily used and more accurate than calipers or tape for small trees.

4075. Marsh, E. K. **The measurement of standing sample trees.** Department of Forestry, Pretoria. 1952. pp. 8. 2 refs. [Commonwealth Forestry Conference, Canada, 1952.]

The type and construction of height-measuring rods in use in S. Africa are described and their advantages in comparison with Bamboo rods are discussed. It is concluded that their use affords a better combination of speed and accuracy than is attainable with instruments incorporating hypsometric devices.

The results of experiments in measuring standing trees with a camera and with a Liljenström dendrometer, each used in conjunction with height-measuring rods, are reported. It was found that: (1) In tilted (oblique) photographs a single diameter measurement is recorded with an accuracy of only ± 2·5 in. and the results are not satisfactory. (2) In horizontal photographs, a single diameter measurement is recorded with an accuracy of only 0·8 in., but in case of necessity these measurements can be made to serve by employing graphical methods of volume calculation. (3) The Liljenström dendrometer not only gives single diameter measurements with the best degree of accuracy (± 0·22 to ± 0·34 in.) and reduces the % of obscured measurements from 17% (for horizontal photographs) to 7%, but is also quicker. It is suggested that the best solution is to use an 8-in. range finder (measuring diameters with accuracy of ± 0·1 in.) in conjunction with height-measuring rods. *From author's summary.*

4076. Grosenbaugh, L. R. **Shortcuts for cruisers and scalers.** *Occ. Pap. Sth. For. Exp. Sta.* No. 126, 1952. pp. 24.

Includes suggestions on cruising without plot boundaries or tree diameters by the Winkelzahl method [cf. *For. Abstr.* 13 (Nos. 3196–8)], computing individual tree volumes without volume tables, computing log volumes by 4 log rules, computing cull % without log rules, and designing sample plans for cruising, scaling or tree measurement.

522. *Height, Length*

See No. 4075.

523. *Bark*

See Nos. 3803, 4108.

524. *Determination of the Volume of Trees and Stands*

See also No. 4076.

524.1. Principles of Volume Determination. Form (Taper)

See Nos. 4077, 4099, 4108–9.

524.3. Volume of Tree Groups and Stands

See also Nos. 4081, 4108.

4077. Mir'ap, M. Göknarlarda şekil ve hacım araştırmaları. [**Research on the form and volume of *Abies* spp.**] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (2), 1951 (143–70). [Turk.g.]

Studies were made on *A. bornmülleriana*, *A. nordmanniana*, and *A. cilicica*. Since the form factor and curves of average volume and height of *A. cilicica* differed considerably from the other two species, a separate volume table was constructed for it. For the smaller diameters, tree height was found to be inversely proportional to the form factor, but for diameters above 17–20 cm., directly proportional. For a given height the form factor decreases with increasing d.b.h., rapidly for smaller and more slowly for greater heights. Age has no clear effect on form factor for a given height, but for a given diameter the form factor increases slightly with age. No clear relationship exists between diameter and age. A study of the relationship between stem form factor, height, and form quotient gave the following results: (1) For a given height the form quotient increases with increasing form factor; (2) For a given form factor, the form quotient increases with increasing height; and (3) for a given form quotient, the form factor increases with increasing height. Form-factor values for different diameters are tabulated, and on the basis of these, volume tables were prepared. Tests of the table for *A. bornmülleriana* and *A. nordmanniana* show errors ranging from + 3·7 to − 2·2% with an average of + 0·3%, and that for *A. cilicica* from + 3·4 to − 4·7% with an average of − 1·3%. Bark volume is estimated at 10% of stem volume including bark. *From author's summary.*

4078. Hummel, F. C., Irvine, T. W., and Jeffers, J. **General volume tables for Japanese Larch in Great Britain.** *For. Rec. For. Comm., Lond.* No. 14, 1951. pp. 12. Price 9*d.*

4079. Hummel, F. C., Irvine, T. W., and Jeffers, J. **General volume tables for Douglas Fir in Great Britain.** *For. Rec. For. Comm., Lond.* No. 15, 1951. pp. 26. Price 1*s.* 6*d.*

524.4. Recording of Data. Organization of Measuring Parties and Their Work

4080. METEER, J. W. **Sorting cards help timber cruising and growth studies.** *Pulp Paper Mag. Can.* 53 (3), 1952 (334).

Summary of a paper presented at the annual meeting of the American Pulpwood Association, February 1952, discussing the use of sorted tally cards for individual trees in management and growth studies. [Cf. *For. Abstr.* 13 (No. 4090).]

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

4081. ANDRADA, E. CAMPOS. Um caso concreto do valor florestal de Moçambique. Algumas observações feitas na Região do Derre. [**A concrete example of the forest resources of Mozambique. Some observations made in the Derre region.**] *Agros* 34 (1), 1951 (67–81 + 4 photos + 4 tbls.). [Port.] A.P.B.

Presents the results of an inventory, including a volume table for *Pterocarpus angolensis.*

4082. BICKFORD, C. A. **The sampling design used in the forest survey of the northeast [United States].** *J. For.* 50 (4), 1952 (290–3). 6 refs.

Describes a method of sampling based on Neyman's equations (developed originally for sampling human populations) and making use of aerial photographs in combination with ground plots.

4083. En jämförelse mellan olika taxeringsmetoder. [**A comparison between different survey methods.**] *Skogsägaren* 27 (6), 1951 (117–9). [Sw.]

Results of comparative surveys carried out by complete enumeration and by strip and plot methods on 95 ha. at Finnabo in Älvsborg county are tabulated to show number of trees and volume o.b. by species and diameter class. The % deviation from the complete-enumeration results was −0·7 and + 0·7 for tree number, and − 0·2 and + 6·8 for volume, for the strip and plot surveys respectively. Approximate costs for strip and plot surveys were 70 and 50% respectively of the cost of complete enumerations.

525. *Volume by Assortments. Merchantable Volume*

See Nos. 3803, 3977, 4076, 4096, 4270, 4368.

526. *Log Measurement. Scaling*

See also Nos. 4076, 4089–91, 4270, 4368.

4084. BAZZALO, B. A., and GARCÍA, J. J. M. Tabla de cubicación de rollizos de quebracho blanco (*Aspidosperma quebracho-blanco* Schlechtd.). [**Volume tables for *A. quebracho-blanco.***] *Lilloa* 18, 1949 (203–10). [Span.g.] A.P.B.

Tables and graphs are presented, compiled from data collected in El Chaco, for calculating the volumes of logs.

4085. SGERM, F. Tablice za kubiranje drobnega tehničnega lesa. [**Volume tables for small timber.**] *Gozd. Vestn.* 9 (9), 1951 (221–6). [Sloven.]

Contains volume tables for thin timber assortments, viz. vineyard poles, orchard poles, well poles, various handles, hoops, and sticks; Schuberg's tables for Spruce and Fir hop-poles are included.

4086. SPAETH, J. N., WALTERS, C. S., and KULP, D. A. **A comparison of methods for determining cubic foot volumes of fence posts.** *J. For.* 50 (2), 1952 (103–7). 3 refs.

Comparison between volume calculated by displacement and by formulae was made on 174 Loblolly Pine posts ranging from 2·1 to 5·6 in. in top diameter. Average top diameter was 3·9 in. and average length 7·1 ft. Displacement was measured in a xylometer made of two 30-gal. range boilers, and the formulae tested were the cone-frustum, Newton's (prismoidal), Smalian's and Huber's. The volumes calculated by formula were of about the same degree of accuracy when compared with displaced volume, and the use of Huber's is therefore recommended, as being the most practical to use since it requires only one diameter and a length measurement and is adapted to the use of a forester's table of basal area. Any of the four formulae may be used on a large number (perhaps 50 or more) of posts having a form factor of 0·89 with the expectation of securing average volumes within ca. 5% of the actual volumes.

4087. **Ontario studies log rules looking to closer evaluation.** *Canada Lumberman, Toronto* 71 (10), 1951 (40–1). X.

Compares 7 log-scaling rules.

4088. GEVORKIANTZ, S. R. **A mill-scale log rule.** *Tech. Note Lake St. For. Exp. Sta.* No. 375, 1952. pp. 2.

Gives examples of the use and comparative accuracy of the formula

$$M = \frac{DL}{20}(D-f)(1-c)$$

where M = estimated mill-tally recovery, D = top d.i.b. of log in inches, L = length of log in feet, c = % defect in decimals, and f = a factor which, if defect is estimated correctly, reflects mill efficiency and sawing practice.

527. *Solid Volume of Stacked Products*

4089. EVANS, T., and MCCLAY, T. A. **Rules-of-thumb for volume and value in pulpwood trees.** *Res. Notes Stheast. For. Exp. Sta.* No. 4, 1952. pp. 2.

Results of a study of Shortleaf and Loblolly Pines showed that pulpwood volume and value of second-growth trees 8–13 in. d.b.h. can be calculated as follows when D = d.b.h. in inches: solid volume of rough wood in a tree in cu. ft. = $4(D-6)$; stacked volume of rough wood in a tree in cords = $\frac{4(D-6)}{100}$; number of trees per cord = $\frac{100}{4(D-6)}$; and pulpwood stumpage value per tree = $\frac{4(D-6)}{100}$ × current pulpwood price per cord.

4090. BELCHER, R. G. **Application of punched card methods to pulpwood scaling.** *Pulp Paper Mag. Can.* 53 (3), 1952 (327).

Information on solid content per cord, species distribution, price, location, point of measurement, contractor and piece-work data, can be used to determine the true cost of fixed units of wood substance by species and for any wood-producing agent. [Cf. *For. Abstr.* 13 (No. 4080).]

4091. MICHELL, A. S. **Weight of wood as a measure of volume.** *Annual Ring* No. 5, 1952 (24–5).

Describes methods used by some Southern U.S. pulp companies, to weigh truck-hauled loads of pulpwood, convert the weight to stacked cords by use of a conversion factor, and keep record of production on a stacked-cord basis.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

4092. VANSELOW, K. Krone und Zuwachs der Fichte in gleichaltrigen Reinbeständen. [**Crown and increment of Spruce in pure, even-aged stands.**] *Forstwiss. Cbl.* 70 (12), 1951 (705–19). 10 refs. [G.g.] [Forstliche Forschungsanstalt, München.]

[Cf. *For. Abstr.* 1 (301).] A study of the variations in the relationship between crown weight and stemwood increment, according to (1) age, and (2) yield class. Measurements were made on 331 Spruces in southern Bavaria, ranging from 40 to 110 years in age. The trees were taken from sample plots representing the 3 yield classes of Vanselow for Spruce in southern Bavaria [cf. *For. Abstr.* 13 (No. 1443)]. Twig and fresh needle weight stand in direct linear relationship to age in all 3 yield classes. The same fresh needle weight produces the greatest increment in yield class I_3, less in II_3 and least in III_3. The curve of stemwood increment as a function of fresh needle weight flattens at the higher axes, i.e. in older trees a fixed needle weight produces less increment than in younger trees. Fresh weight of needles per ha. in the stand in all 3 yield classes is greatest at the age of 40 years, and then sinks slowly. The stemwood increment per ha. in relation to fresh needle weight follows the same pattern as in individual trees.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 4092, 4099.

4093. COILE, T. S. **Soil productivity for Southern Pines.** *For. Fmr.* 11 (7; 8), 1952 (10–1, 13; 11–12).

Gives site index tables for Southern Pines [*Pinus echinata*, *P. taeda*, and *P. rigida* var. *serotina*] based on the following factors and combinations of them: depth of topsoil, texture of subsoil, surface drainage, moisture equivalent, and depth of soil to mottling. [Cf. *For. Abstr.* 13 (No. 1973).]

4094. GOGGANS, J. F. **Slash and Loblolly Pine plantations in Alabama's Piedmont region.** *Circ. Ala. agric. Exp. Sta.* No. 99, 1951. pp. 22. 11 refs.

The main emphasis of this study was on the correlation of soil variables with early height growth, regression analysis being used with the following soil variables: (1) % of sand in A horizon, (2) % of clay in A horizon, (3) moisture equivalent of A horizon, (4) imbibitional water value of A horizon, (5) depth of A horizon, (6) moisture equivalent of B horizon, and (7) imbibitional water value of B horizon. The only significant correlation was with (5), but this correlation was so high that it was possible to classify planting sites from the standpoint of early growth, on the basis of this variable alone.

A study was also made of the effect of mixtures on survival and on incidence of *Cronartium* disease. [Cf. *For. Abstr.* 11 (No. 3285).]

4095. PLACE, I. C. M. **Silviculture during 1950–51.** *Rep. Marit. Sect. Canad. Inst. For. 1950/51*, 1951 (16–21). 5 refs.

Compares Hills' system of site classification [cf. *For. Abstr.* 12 (No. 832)] with one evolved at the University of New Brunswick by Prof. H. D. Long, making use of wider vegetation associations and soil moisture, and discusses their use in soil mapping.

55. AGE DETERMINATION

See No. 4103.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 3725, 3740, 3803, 3805, 3821–3, 3834–8, 4092.

4096. FRANČIŠKOVIĆ, S. Biometrika u šumarskoj praksi. (Određivanje linije regresije). [**Biometrics in forest practice. (Determination of the regression line).**] *Šumarstvo* 4 (1–2), 1951 (12–9; 89–103). 4 refs. [Serb.e.f.]

Includes illustrations of the application of regression equations to problems of forest outturn and forest increment.

4097. MIHAJLOV, I. S. Matematičko formuliranje na zakonot za rastenjeto na šumskite drva i nasadi. [**Mathematical formulation of the law of growth of forest trees and stands.**] *God. Zborn. zemj.-šum. Univ. Skopje* 1, 1947/48 (1949), (3–70). 27 refs. [Maced.russ.f.]

Analyses conditions that must be fulfilled by growth and increment equations, and reviews in detail various equations developed by different authors since ca. 1880. Assuming that the increment function, corresponding to observational data, is a fractional rational function, the author derives the following two-constant and three-constant functions for (i) growth and (ii) increment:

(1) two-constant functions:

$$\text{(i) } ae^{-\frac{b}{x}} \text{ and (ii) } \frac{k}{x^2}e^{-\frac{b}{x}}$$

(2) three-constant functions:

$$\text{(i) } ae^{-\frac{b}{x^c}} \text{ and (ii) } \frac{k}{x^c+1}e^{-\frac{b}{x^c}}$$

where a, b, and k ($= ab$) are constants, and x is the age in years. The equations obtained are shown to be consistent with the shape of empirical curves. Methods of evaluating the constants are discussed for an actual case.

4098. MIKOLA, P. **Puun kasvun luonnollinen kehitys. [The natural course of tree growth.]** *Metsät. Aikak.* 1952 (2), (40–4). 7 refs. [Fi.e.]

The growth of a tree has a definite course which depends on the species and environment. Radial growth rates increase, soon reach a maximum and then decline; different formulae for the hyperbola representing this decline are discussed and graphs presented showing the normal course for dominant trees in some representative Pine and Spruce stands; also tables showing for different site-types the average age at which the ideal curve passes its maximum and of the point of inflection. The current basal-area growth reaches its maximum later than the radial growth and the decline is slower, while the course of height growth resembles that of radial growth. These findings are in good agreement with data from Ilvessalo's yield tables. *From author's summary.*

4099. DELEVOY, G. Contribution à l'étude de quelques variétés de *Pinus nigra* Arn. en Belgique. IV. Esquisse de la productivité du pin de Corse. **[Study of some varieties of *P. nigra* in Belgium. IV. Increment of Corsican Pine.]** *Trav. Sta. Rech. Groenendaal* (*Sér. B*) No. 11, 1951. pp. 20. 18 refs. [F.f.flem.]

The rather scanty available data are analysed in various ways. Stands are classified (1) according to stand density at 30 years, (2) according to 'index of productivity' (= mean height of dominants at 30 years) and (3) according to the ratio (1)/(2). For each of the classes in (3) a stand form factor at 30, 40, and 50 years is calculated, the factor being the ratio $V/G.H$, where V = true volume, G = basal area at 1·50 m., and H = mean height, of the stand. It is considered that this factor, though it does not exactly represent the mean of the form factors of the individual trees, approximates to it and shows growth trends adequately for practical purposes. The following data are tabulated and discussed: mean height, mean diameter [? at 1·50 m.], basal area, and volume, all classified by classification (3) above, and subdivided into age groups. Figures are given for (*a*) total stand, (*b*) dominants, and (*c*) sub-dominants.

4100. CALDART, F. Castagneti, produzione legnosa, e industria del tannino, nella valle del medio Piave. **[Yield of timber and tanbark from Chestnut stands in the middle Piave valley.]** *Monti e Boschi* 3 (3), 1952 (108–13). [It.f.e.]

Though on the edge of its range, the Chestnut displays a satisfactory rate of increment in the valley of Belluno (figures given) and it is recommended that the existing, neglected stands should be felled and managed as coppice.

4101. LØVENGREEN, J. A. **Fra Bregentveds Egeskove: Tal og Tilvækst. [Increment and other data on the Bregentved Oak forests.]** *Dansk Skovforen. Tidsskr.* 36 (4), 1951 (161–202). [Dan.]

Gives tables and graphs showing height, diameter, basal area, site class, stems/ha., and increment for the total area, for sample plots and for sample trees.

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

4102. MCCULLY, W. G. **Measuring diameter changes in small stems [of less than 2 in. diameter].** *Ecology* 33 (2), 1952 (300–1). 2 refs. [Texas Agricultural Experiment Station, College Station, Texas.]

Disks ¼ in. in diameter are stamped from 0·020 sheet aluminium and glued to opposite sides of the stem, using acetone cement. Diameter increment is reckoned as the increase in distance between these two points over a given period, as measured with a micrometer caliper having a friction stop (illustrated).

4103. MILLER, R. G. **A girth increment study of *Baikiaea plurijuga* in Northern Rhodesia with reference to the determination of age and rotations for species without annual growth rings in irregular natural forest.** *Emp. For. Rev.* 31 (1), 1952 (45–52).

This note deals with the study of some girth-increment figures derived over a ten-year period from a tree-increment plot in *Baikiaea plurijuga* 'forest' in Northern Rhodesia. The method proposed by A. Foggie [cf. *For. Abstr.* 8 (No. 751)] was used in interpreting these records, and comments and suggestions are made thereon. Although the available data were extremely limited, it is tentatively concluded that *B. plurijuga* may be expected to attain 45 in. girth in 100 years on good-quality sites. *From author's summary.*

4104. MEMELINK, G. De invloed van het droge jaar 1947 op de groei van lariks, douglas en groveden. **[The influence of the dry year, 1947, on growth of Larch, Douglas Fir and Scots Pine.]** *Tijdschrift der Nederlandse Heidemaatschappij, Arnhem* 62 (10), 1951 (299–302). [Du.du.] H.S.B.

Measurements were made by increment borings on 15- to 20-year Larch, Douglas Fir and Pine in the Central and Southern Netherlands to determine the effect of the 1947 drought. Larch on moister, rather loamy soils showed slightly reduced increment in the early wood and much reduced increment in the late wood in 1947, and very little increment throughout 1948–9. Increment approached normal again in 1950. On dry soils increment was also reduced but less so than on the moister sites. There was no apparent response to thinnings carried out in 1947–9. Douglas Fir was unaffected by the drought, and increment remained steadily good. Increment of Scots Pine was rather low in 1947, but was normal in 1948–50.

4105. SIPKENS, D. De droge zomer 1947 en de diktegroei van enige houtsoorten in Drenthe. **[The dry summer of 1947 and the diameter increment of some tree species in Drenthe.]** *Ned. Boschb.-Tijdschr.* 24 (4), 1952 (85–9). [Du.e.]

Measurements were made by increment borings on *Larix leptolepis* on (1) sandy dry soils and (2) soils with better water-holding capacity, and on *Pseudotsuga taxifolia*. Results differed from those obtained in the central and southern Netherlands [cf. preceding abstract]. All trees showed greatly reduced increment in 1947 with a recovery during 1948–50, and a return to about the 1943–6 average by

1951. There appeared to be a close correlation between annual diameter increment and Oelkers' precipitation factor $\frac{\text{precipitation in mm.}}{\text{average temperature in ° C.}}$ The distribution of rainfall throughout the year was also found to be very important. Poor diameter growth in 1949 is attributed to low precipitation during the current growing season and the previous winter. Although diameter growth of Larch was poor for 1947–50, no trees died.

4106. Todorović, D. O procentu prirasta. [Increment percent.] *God. Zborn. zemj.-šum. Univ. Skopje* 1, 1947/48 (1949), (71–149). 30 refs. [Serb. russ.f.]

A comprehensive theoretical analysis of a dozen known mathematical formulae for the evaluation of increment %, based on (1) arithmetic, (2) geometric, and (3) logarithmic series. When comparing the three fundamental expressions (arithmetic series, Leibniz' formula, and Turski's formula), the author gives preference to the last, viz.

$$p = 100\,\frac{\log c_n - \log c_o}{n},$$

where c_o refers to the beginning of the 1st year, and c_n to the end of the n-th year. Several approximative forms (without logarithms) of Turski's formula are given.

4107. Colette, L. Les temps de passage. [The time taken by trees to pass to a higher diameter class [in Beech/Oak selection forest].] *Bull. Soc. for. Belg.* 59 (3), 1952 (144–8 + 1 tbl.). [F.]

566. *Yield Tables and Their Construction*

4108. Kissin, I. Crescimento e produção de pinheiro brasileiro. [The growth and yield of *Araucaria angustifolia*.] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (429–77). [Port.port.g.e.]

A study containing provisional yield tables, compiled by a slight modification of Schlich's strip-height method, and based on the measurement of 83 sample plots in plantations in the state of São Paulo. Although the investigation covered stands up to the age of 23 years only, it revealed significant trends, showing *inter alia* that: (1) Paraná Pine is a fast growing species compared with most conifers grown inside their natural range (at 23 years the stemwood m.a.i. can exceed 15 cu.m./ha.); (2) in all quality classes, the greater part of the volume at 23 years can be utilized as pulpwood; (3) plantations of Paraná Pine can yield a fair return on the capital invested.

Comparative studies on *Cryptomeria japonica* and *Cunninghamia lanceolata* showed that the volume growth of the latter species can exceed considerably that of Paraná Pine. The paper also includes volume tables for stemwood and bark, data on the development of individual trees (based on stem analyses), observations on stem form etc. [Cf. *For. Abstr.* 13 (No. 3803).] *From author's summary.*

4109. Grandjean, A. J. Een vergelijking van Deense, Engelse en Nederlandse opbrengstgegevens van de Japanse lariks. [A comparison of yield data for Japanese Larch in Denmark, England and the Netherlands.] *Ned. Boschb.-Tijdschr.* 24 (6), 1952 (147–59). 10 refs. [Du.du.e.]

Figures for height, diameter, basal area, form factors, timber volume, annual increment, and number of trees per ha. at different ages, for different thinning grades, are compared for Holland, Denmark [cf. *For. Abstr.* 13 (No. 2341)] and Great Britain [cf. *For. Abstr.* 11 (No. 2360)]. Total volume yield in cu.m./ha. o.b. is higher in Denmark than in Great Britain and much lower in Holland. Average height for Holland during the first 20–25 years is greater but thereafter is lower than for the other two countries. The comparative figures are shown in graphs and tables.

4110. West-Nielsen, G. Rødgranens produktionsforhold på den midtjydske hede. [Yield of Norway Spruce on the heaths of central Jutland.] *Dansk Skovforen. Tidsskr.* 36 (4), 1951 (227–48). [Dan.]

568. *Other Mensurational Studies of Stand Constitution and Changes therein. Distribution of Growth by Tree Classes etc.*

See also Nos. 3821, 4123.

4111. Cervera Ibañez, J. M. Distribución diamétrica en las masas irregulares. [Distribution by diameter class in uneven-aged stands.] *Montes, Madrid* 7 (42), 1951 (441–9). [Span.]

A study of distribution and frequency of diameter classes from a statistical point of view, based on data from a stand of *Pinus* spp. in Sierra Segura.

569. *Increment; Development and Structure of Stands: Miscellaneous*

4112. Sirén, G. Lisäpiirteitä puun kasvun laskentaan. [Some additional aspects of the calculation of increment.] *Metsät. Aikak.* 1952 (1), (17–8). [Fi.e.]

One source of error in calculating increment is the varying effect on ring width, at different heights in the stem, of fellings round the tree in question. More serious is the variation in different trees of the proportion of early and late wood, and the corresponding differences in dry-weight increment between trees having the same volume increment. It is likely that the increasing use of wood in chemical industry will necessitate a form of measurement of the dry-weight increment. *From author's summary.*

58. SURVEYING AND MAPPING (INCLUDING AERIAL SURVEYS)

581/584. *Ground Surveys*

4113. Volpini, C. La bussola forestale. [The forestry compass.] *Monti e Boschi* 3 (3), 1952 (136–9). [It.]

Describes and illustrates four types of compass (Neuhöfer, Morin, Kern) and one theodolite compass (Wild), and their use in surveying. [Cf. *For. Abstr.* 13 (No. 1447).]

4114. Riley, T. E. Compass surveying grows up—the compass theodolite method of economical surveys. *J. For.* 50 (2), 1952 (117–9).

Describes the compass theodolite and its use in traversing.

585/588. *Aerial Reconnaissance and Survey*

See also Nos. 3923, 3987, 4082.

4115. Losee, S. T. B. **Photographic tone in forest interpretation.** *Photogrammetric Engineering, Menasha, Wis.* 17 (5), 1951 (785–99). 8 refs.

Discusses the importance of tone in the interpretation of aerial photos of forest and reviews in detail the rather scanty quantitative data available on the subject.

4116. Colwell, R. N. **Relationships between military and forest photo interpretation.** *J. For.* 50 (4), 1952 (271–6).

4117. Rogers, E. J. **Large-scale airphotos tested in forest survey, prove unsatisfactory.** *Ntheast. Res. Notes Ntheast. For. Exp. Sta.* No. 12, 1952 (1–3).

Experiments were made on the interpretation of photographs of scales ranging from 1 in. = 100 ft. to 1 in. = 1,800 ft. Estimated timber volumes, tree heights and crown diameters, and identification of species, were checked by observations on ground plots. The accuracy obtained by using large-scale photographs was very little greater than with the ordinary small-scale ones. Suggested reasons are: fluctuations in photo scale with tree height in the large-scale photographs; the difficulty of making tree measurements in winter photographs when the lighter tree tops were overexposed to ensure adequate exposure of the dark ground; and the over-detailed view of the foliage in summer photographs.

4118. Haider, A. Luftfotogrammetriens brukbarhet ved taksering og kartlegging av skog. [**The use of aerial photogrammetry in forest surveys and mapping.**] *Tidsskr. Skogbr.* 60 (3), 1952 (41–67) 9 refs. [Nor.]

The results of 3 years' research by Statens Skogtaksasjon on 30,000 dekares on Hattfjelldal, ranging from 220 to 700 m. above sea level. The area consists of a dense Birch overstorey with an understorey of Spruce; in some parts the Birch has been removed. Photographs were taken in late September 1949 and in the early morning in July 1950: in both sets the shadows are long, and the two sets cannot easily be compared because of the difference in light and in foliage. The accuracy of photogrammetric maps was checked by determining the co-ordinates and height above sea level of unmarked and of specially marked points (boundary marks etc.) and by comparing these with results obtained trigonometrically on the ground. The differences between the x and y values and the heights above sea level are tabulated and the mean error is calculated. Error is much higher for the points not specially marked. It is concluded that for determining special fixed points, such as boundary marks, ground survey is preferable, while photogrammetric methods give more accurate results for contours; height above sea level can always be determined more accurately than is necessary from the photographs and some relaxation of standards, with consequent reduction in cost, would be allowable. Tabulated results of surveys, from the ground in 1949 and using the aerial photographs with a correction factor for height above sea level in 1950, of total area of productive forest, and distribution, by 'felling classes' [cf. *For. Abstr.* 13 (No. 3251)] and by site classes, show that sufficient accuracy for most forestry purposes can be obtained by measuring lengths and areas directly on the photographs. Results showing total volume and cu.m./dekare for the different felling classes as determined from sample trees, are reasonably close for the two years. Another aerial survey was carried out in 1951 at Femund on 830,000 dekares of open forest, with uniform site and felling classes, lying between 650 and 750 m. above sea level. In these easier conditions a simplified method of measuring from the aerial photographs could be used and it is calculated that in similar conditions good results can be obtained at costs very much lower than those for ground surveys.

4119. Flygbilden i skogsbrukets tjänst: betänkande avgivet av Kommittén for Skoglig Fotogrammetri. [**Aerial photographs in the service of forestry: a report by the Committee for Forest Photogrammetry.**] Statens Reproduktionsanstalt, Stockholm. 1951. pp. 196 + [6]. [Sw.e.]

Reviews the use of aerial photographs in the past in the U.S.A., Canada, Germany, Finland and Sweden, and discusses aerial photographs and their supply (with recommendations on photographic techniques and methods of interpretation), and the potential use of aerial photography in Swedish forestry, research, and training. Includes discussion of conclusions by the Committee, from practical experiments, on estimating site quality, the number of trees per unit area, height, crown diameter, volume of individual trees and stand density, and on determining species, stand limits and topography.

4120. Browne, F. G. [**Visual aerial reconnaissance in Sarawak.**] *Malay. Forester* 15 (1), 1952 (37–8).

Two fairly long reconnaissance flights have been made recently in Sarawak. Both yielded data of great interest, but also confirmed previous impressions of the limitations of this type of observation. The general nature of the forest can be judged, the spread of shifting cultivation and soil degradation can be all too easily observed, and the general workability of the forest terrain can be fairly well estimated. But in the whole length of these two flights totalling ca. 1,000 miles, it was possible to identify only two species (*Shorea albida* and *S. argentifolia*) and one genus (*Dryobalanops*), with any certainty, even at very low levels.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

See also No. 3553.

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 3725, 4103, 4126.

4121. CHAPMAN, H. H. **The problem of second growth in its relation to sustained yield.** University of British Columbia. 1951. pp. 13.

4122. RAVE, D. Untersuchungen der Leistungen normaler Betriebsklassen mit langjähriger Verjüngung unter dem Altholzschirm. [**Investigation of the yield of normal felling series, with gradual regeneration under cover of the mature trees.**] *Forst u. Holz* 7 (3), 1952 (33–4). [G.]

Cites some examples of the differences in yield from stands regenerated under a shelterwood and those regenerating naturally or artificially in full light, after clear felling. This factor is not usually taken into account when drawing up yield tables but is important in planning management.

4123. MEYER, H. A. **Structure, growth, and drain in balanced uneven-aged forests.** *J. For.* 50 (2), 1952 (85–92). 5 refs. [Pennsylvania State College.]

The substance of an earlier article by the same author [cf. *For. Abstr.* 12 (No. 3532)] applied to some American data.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also No. 4123.

4124. VERSTEGH, F. Proeve van een bedrijfsregeling voor de vloedbossen van Bengkalis. [**Design for a working plan for the Mangrove forests in Bengkalis, Sumatra.**] *Tectona* 41 (3/4), 1951 (1952), (200–58 + 1 map). 23 refs. [Du.du.e.jav.]

4125. BLOOMER, L., and GALLOWAY, J. A. **Systematic management of uneven-aged woodlands.** *Quart. J. For.* 46 (2), 1952 (83–91 + 3 photos). 8 refs.

Describes the Swiss 'méthode du contrôle' and as a practical illustration gives details of work carried out by the authors in one particular wood.

4126. COLETTE, L. La coupe—intensité et rotation. [**Intensity of felling and cutting cycles.**] *Bull. Soc. for. Belg.* 59 (2), 1952 (84–9). [F.]

Discusses methods of calculating intensity of cut and cutting cycles in selection forest and works out examples for (*a*) normal broadleaved selection forest, (*b*) a stand with an excessive proportion of large old trees, and (*c*) one with a deficiency of young growth.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 3733, 3828–9, 3839, 3934–5, 4089, 4481.

4127. STREYFFERT, T. **Skogsbrukets driftsekonomi. [The economics of forestry.]** Skogshøgskolans Kompendiekommitté, Stockholm. 1949. pp. 29. Many refs. [Sw.]

Discusses generally the different kinds of costs, reviews forestry costs, distinguishing between long-term and short-term costs, and discusses the principles of calculating the latter.

4128. KOTWAL, E. K. **Casuarina plantations in Bombay State.** *Indian For.* 78 (5), 1952 (267–8).

Financial returns from Casuarina plantations on a 15-year rotation are much higher than from others on a 20-year rotation. The wood is mainly used as fuel by bakers in Bombay, who prefer the smaller wood. Rotations are now being generally reduced to 15 years.

4129. BURKLE, J. L., and GUTTENBERG, S. **Marking guides for Oaks and Yellow-Poplar in the southern uplands.** *Occ. Pap. Sth. For. Exp. Sta.* No. 125, 1952. pp. 27.

The factors for determining financial maturity, for timber logs, sleepers and mine timbers, are discussed. Bark and crown characteristics for high, low and medium vigour are described and the bark characteristics are illustrated by photographs. A table, to be used as a simplified marking guide, shows for each vigour class and two rates of return, the maximum tree diameters to be left to grow for a further 5-year period. [Cf. *For. Abstr.* 13 (No. 3254).]

4130. Kostprijsberekening voor hout van groveden, Douglas, populier, en inlandse eik. [**Calculating the cost price of timber of Scots Pine, Douglas Fir, Poplar and native Oak.**] *Rapport, Landbouw-Economisch Instituut, Den Haag* No. 144, 1951. pp. 47 + 8. [Du.]

Gives tabulated figures showing: (1) the distribution of costs among the various operations from site preparation to felling; cover against damage, and rates and taxes; maintenance and insurance of building and equipment; and interest; and (2) the calculated cost price per cu.m. for different rotations, sites, and rates of interest for *Pinus sylvestris* (distinguishing between costs of reforestation and of reclaiming waste land), *Pseudotsuga taxifolia*, *Quercus robur*, and *Populus* spp. planted either in stands or along roadsides.

4131. Retningslinjer og hjelpetabeller for vurdering av skog og skoggrunn ved ekspropriasjon. [**Principles and tables used in the valuation of forests and forest sites in case of expropriation.**] Bøndernes Forlag A/S, Oslo. 1950. pp. 32. [Nor.]

Discusses methods of calculating compensation when the whole or part (as when power lanes are cut) of a forest is expropriated, and includes tables for calculating soil value on different sites, for varying ages, rotations and rates of interest, expectation value for stands of different ages on different sites, and the net value per cu.m. for the rest of the rotation period at different ages.

66. COSTING OF LOGGING OPERATIONS

See Nos. 3884, 3914.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

681. *National (Federal, State) Forest Services and Administration*

4132. KOUTERO, N. Neuvostoliiton metsähallinnon kehityksen ja nykisen tilan pääpiirteet. [**The development and present status of forest administration in the Soviet Union.**] *Metsät. Aikak.* 1951 (7/8), (187–91). 3 refs. [Fi.e.]

4133. MAUNG HMAN. **Organization of forest services.** *Burmese For.* 1 (2), 1951 (45–51). 4 refs.

Mainly an account of forest administration in Burma, past and present.

685. *Planning and Organization of Telecommunications*

4134. COTTON, D. C. **Radio speeds up pulpwood production and procurement.** *Pulp Paper Mag. Can.* 53 (3), 1952 (329).

Summary of a paper presented at the annual meeting of the American Pulpwood Association, February 1952, discussing the use of radio especially in arranging for break-down repairs, prompt treatment of accidents, and fire protection and control.

686. *Planning and Organization of Buildings, Transport Installations (Roads etc., including Power-line Rights-of-Way)*

4135. EDÉN, J. Huggning och underhåll av skogsgator för kraftledning. [**Felling and maintenance of forest lanes for power lines.**] *Skogen* 37 (11), 1950 (230–3). [Sw.]

Discusses the present tendency to allow narrower power lanes and gives figures showing the breadth required for different voltages of power line on different site-quality classes. [Cf. *For. Abstr.* 13 (No. 3265).]

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

See also No. 3553.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 4143, 4268, 4449, 4455.

4136. **Yearbook of forest products statistics 1951.** FAO, Rome. 1951. pp. 182. [E.F.Span.]
Contains new information for 1950 and revised data for 1949, for more than 100 countries.

4137. MYERS, W. J. **Pulpwood: a European raw-material problem.** *Foreign Comm. Wkly.* 47 (1), 1952 (3–4; 24–7). A.P.B.
Reviews the pulpwood resources of the principal Western European countries.

4138. VUJIČIĆ, L. Šumski i drvno-industriski proizvodi u našoj spoljnoj trgovini u 1950 godini. **[Forest products and wood industry products in [Jugoslavian] foreign trade in 1950.]** *Šumarstvo* 4 (5), 1951 (303–12). 6 refs. [Serb.f.]

4139. STAMENKOVIĆ, B. O potrošnji i izvozu rezane građe četinara. **[Home consumption and export of converted softwood [in Jugoslavia].]** *Šum. List* 75 (11), 1951 (355–62). [Croat.]

4140. **Statistics tell Canadian story in relation to industrial growth.** *Canada Lumberman, Toronto* 71 (10), 1951 (48–9). X.
Gives some figures for timber and wood products showing industrial production, employment and earnings in forestry and timber manufacture, time lost in labour disputes, wholesale price indexes, sawn timber production, value of retail trade, exports, and freight carried on Canadian railways, for the years 1939, 1950 and 1951.

4141. MERRICK, G. D. **Wood used in manufacture [in the U.S.A.]—1948.** *For. Resour. Rep. U.S. For. Serv.* No. 2, 1951. pp. ii + 66.

4142. STREYFFERT, T. Förenta Staternas massa- och pappersindustri med särskild hänsyn till dess råvaruförsörjning. **[The United States pulp and paper industry with special reference to its supply of raw material.]** *Skr. K. Skogshögsk., Stockh.* No. 7, 1952. pp. 85. [Sw.sw.e.] Price *Kr.*4.

73. PRICES

4143. Prisutvecklingen för virke och skogsprodukter under och efter kriget. **[Price trends for timber and forest products during and after the war.]** *Skogen* 38 (6), 1951 (114–5). [Sw.]
Prices from 1939 to 1950 for unbarked pulpwood, export pulp, standing timber, unbarked 8-in. Pine and sawn Pine and Spruce, and total production and exports of pulp in 1937, 1945, and 1948–9, are given in graphs.

78. ECONOMICS OF TRANSPORT

4144. O parque de madeira do porto do Rio de Janeiro. **[The timber depôt of Rio de Janeiro port.]** *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (128–30). [Port.e.]
A brief description of the depôt, with a plan and photographs.

8. FOREST PRODUCTS AND THEIR UTILIZATION

See also No. 4473.

4145. **List of publications on logging, manufacture, and utilization of timber, lumber, and other wood products.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*790, 1951. pp. 19. P.R.

4146. **Research facilities of the Forest Products Laboratories Division. Ottawa Laboratory. Vancouver Laboratory.** *Mimeo. For. Prod. Lab., Can.* No. *O*–161, 1952. pp. 6.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

4147. SANDERMANN, W. Die Methodik radioaktiver Spuren in der Holzforschung und Holztechnik. **[Radioactive tracer methods in wood research and wood technology.]** *Holz Roh- u. Werkstoff* 10 (3), 1952 (81–7). 30 refs. [G.g.] P.R.
Describes their application in (1) determining the age of timber, (2) physiological research (e.g. photosynthesis, N fixation), and (3) measurement of paper sheet thickness. The references are mostly British and American.

810. *General Information on Woods*

See also Nos. 3634–5, 3637, 3643, 3667, 4405, 4455.

4148. KINLOCH, D., and MILLER, W. A. **Gold Coast timbers.** Government Printer, Gold Coast. 2nd ed., 1949. pp. xii + 39 + 3 tbls. + 1 map.
The first edition of this booklet was published in 1941 [cf. *For. Abstr.* 3 (307)]. The information given for each of a number of species includes weight, colour, durability, impregnation, seasoning, working qualities, and uses.

4149. SARDINHA, A. MANUEL. Os modernos empregos da madeira e a sua importância para o futuro económico de Angola. **[Modern uses of wood and their importance for the future economy of Angola.]** *Agros* 34 (1), 1951 (31–8). [Port.] A.P.B.
Up to the present the forests of Angola have been exploited solely for constructional and cabinet-making timbers and for fuelwood. The author discusses the possibilities of using a wider variety of species for dry distillation, plywood, improved wood etc.

4150. SOUSA, A. DE F. GOMES E. Madeiras de Moçambique. [**Mozambique timbers.**] *Agros* 34 (1), 1951 (59–66). [Port.] A.P.B.

A list of 32 timbers with brief notes on their properties.

4151. GOMES, P., and FERNANDES, H. Florestas amazônicas. [**The Amazonian forests.**] *Carib. For.* 12 (4), 1951 (141–58). [Port.e.span.]

Notes on the vegetation and climate of the region, transport facilities, exploitation and exports, with a list of the most important timber species classified according to their uses, and giving their vernacular and botanical names and the specific gravity of the timber.

4152. **Surinam timber—a summary with brief descriptions of the main timber species of Surinam.** Surinam Forest Service. [1952?]. pp. 35 + 1 tbl. 57 refs.

Descriptions of individual species, their mechanical and physical properties, uses and local and botanical names.

4153. ROE, F. W. **The natural resources of Sarawak.** Government Printer, Kuching, Sarawak. 1952. pp. 38 + 28 photos + 1 map. Price Straits $0·50 (1*s.* 2*d.*).

Includes an account of the principal timbers and minor forest products.

4154. **Specimen woods Nos. 196–7.** *Suppls.* to *Wood* 17 (4; 5), 1952 (141–2; 183–4).

Geronggang (*Cratoxylon arborescens*); and Yemeri (*Vochysia hondurensis*).

4155. LAMB, G. **Foreign woods.** *Wood, Chicago* 57 (4), 1952 (78–9). P.R.

Cedro branco (*Cedrela huberi*), Carabali (*Albizzia caribaea*), and Peroba de campo (*Paratecoma peroba*).

4156. GERRY, E.; MILLER, C. M. **Information leaflets. Foreign woods.** *Rep. U.S. For. Prod. Lab., Madison* Nos. *R*1902, 1951, pp. 8. 27 refs; *R*1905, 1951, pp. 12. 33 refs. P.R.

(*a*) Hura wood or Possum wood, 'Rakuda' (*Hura crepitans*); (*b*) Avodire (*Turraeanthus africana*).

4157. KEYLWERTH, R. Mittel- und Südamerika. Assacu. [**Central and South America. *Hura crepitans, Hura polyandra.***] *Holz Roh- u. Werkstoff* 10 (2), 1952 (79–80). 6 refs. [G.] P.R.

Cf. *For. Abstr.* 13 (No. 1480).

4158. BERKEL, A. Lübnan sedîrinde teknolojik araştirmalar. [**The properties of *Cedrus libani.***] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (1), 1951 (182–211). [Turk.g.]

Anatomical features of the wood, and the results of tests of its physical and mechanical properties.

4159. NAJERA Y ANGULO, F. Studio della struttura, caratteristiche fisico-mecchaniche ed applicazioni del legno di *Pinus canariensis* Sm. [**The structure, physical and mechanical properties, and uses of *P. canariensis* wood.**] *Monti e Boschi* 3 (3), 1952 (120–30). [It.f.e.]

Illustrated by photomicrographs and with data on *P. sylvestris* and *P. pinaster* for comparison. There is a significant difference between the usual wood and the very resinous wood found in some individuals.

4160. GUINIER, P. **Le pin maritime.** [***Pinus pinaster.***] *Rev. Bois Appl.* 7 (4), 1952 (3–7). [F.]

Description of the tree, its distribution, races, habitat, wood structure, properties and uses.

4161. BARBOUR, W. R. **Cativo.** *J. For.* 50 (2), 1952 (96–9). 4 refs.

Describes growth habits and range of *Prioria copaifera*, which occurs on the Atlantic coast of Central America, the properties of the wood, and methods of logging.

4162. GARDNER, C. A. **Trees of Western Australia: 1. Karri [*Eucalyptus diversicolor*] and Jarrah [*E. marginata*].** *Leafl. Dep. Agric. W. Aust.* No. 1078, 1952. pp. 9.

Botanical notes and wood properties.

811. *Structure, Identification*

See also No. 4200.

4163. STEARNS, T. L. **Distinguishing Red Oak from White Oak by chemical colour reaction.** *Sth. Lumberm.* 184 (2306), 1952 (50).

A mixture in equal amounts of solutions of benzidine and $NaNO_2$ gives a light to medium reddish-orange colour on Red Oak and a dark greenish-brown on White Oak.

4164. AMOS, G. L. **Sub-projects W.S. 1–2: Wood anatomy of the *Myrtaceae*—pale-coloured Eucalypts, Progress report No. 9: W.S. 1–3: Wood anatomy of the *Myrtaceae*—non-Eucalypts, Progress report No. 4: The use of ash characteristics as a means of identifying some timbers of the *Myrtaceae*.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organisation, Melbourne. 1951: pp. 11. 3 refs. P.R.

Certain timbers previously included in the genus *Myrtus* yield a deep-bistre-brown ash with a high Mn content. These fall into the new genus *Austromyrtus* proposed by Burrèt (1941). Other timbers of the *Myrtaceae* yield ashes which are recognizable as distinct types—faint pink with low Mn content, white with no Mn, brown with high Fe content, red with high Mn content, off-white with low Mn content, and ashes negligible in bulk (less than 0·05% of the dry weight). In many species the ash types appear to be constant, and may be used to distinguish between species or groups of species which are not readily separable on anatomical features alone. *Author's summary.*

4165. JOHNSTON, D. R. **Structure drawings to 'Specimen Woods' Sheets 10; 11.** *Wood* 17 (4; 5), 1952 (140; 182).

(10) Redwood (*Pinus sylvestris*), European Larch (*Larix decidua*), Yellow Pine (*Pinus strobus*) and Whitewood (*Picea abies*).

(11) Kingwood (*Dalbergia cearensis*), Black Bean (*Castanospermum australe*), Sequoia (*S. sempervirens*) and Sycamore (*Acer pseudoplatanus*).

4166. BANNAN, M. W. **The microscopic wood structure of North American species of *Chamaecyparis*.** *Canad. J. Bot.* 30 (2), 1952 (170–87 + 6 photos). 28 refs. P.R.

Trends in variation in different parts of the tree with regard to such anatomical features as tracheid

and ray cell dimensions, size and distribution of rays, size and arrangement of pits, and thickness of cell walls resemble those recorded for other Cupressaceae. Comparative data relating to homologous wood samples show slight differences in mean values between the three American species but the intraspecific variability is usually so extensive that the specific ranges overlap widely. No single microscopic character seems completely reliable for diagnostic purposes, but certain structural features are valuable when used together. These are the frequency of ray tracheids in newly formed rays, the thickness of the horizontal and end walls of ray parenchyma cells, the number of pits per crossing field, and the height/width ratio of ray cells viewed tangentially. *Author's summary.*

4167. OZENDA, P. Recherches sur les dicotylédones apocarpiques: contribution à l'étude des angiospermes dites primitives. [**Studies in the apocarpic dicotyledons: a contribution to the study of the 'primitive' angiosperms.**] *Publications des Laboratoires (Biologie), École normale supérieure, Paris* No. 2, 1949. pp. 183. Many refs. [F.f.] X.

A histological and morphological study of the Magnoliales, including a discussion of the value of wood anatomy for comparative anatomy and phylogeny.

4168. NORMAND, D., and CAVACO, A. Observations taxonomiques et xylologiques sur le genre *Pinacopodium* Exell et Mendonça. [**The taxonomy and wood anatomy of the genus *Pinacopodium*.**] *Bull. Jard. bot. Brux.* 21 (3/4), 1951 (451–63). [F.] O.B.D.

811.1. Anatomical Elements and Tissues

See also Nos. 3701, 4175–6, 4182–3, 4230.

4169. WARDROP, A. B. **Cell wall organization and the properties of the xylem. I. Cell wall organization and the variation of breaking load in tension of the xylem in conifer stems.** *Aust. J. sci. Res.* 4*B* (4), 1951 (391–414 + 17 photos). 35 refs. P.R.

The variation of breaking load in tension of tangential longitudinal sections of wood, taken from successive growth rings of each of 6 conifer stems [*Pinus radiata, P. pinaster*, and *Pseudotsuga taxifolia*], has been studied. An increase in this property was observed in successive growth rings from the stem centre of each specimen. This was paralleled by an increase in tracheid length, basic density, and cellulose content. The inclination to the longitudinal cell axis of the spiral micellar system of the cell wall decreased with increasing tracheid length. Because of this known relation between spiral angle and tracheid length, the latter was used as an index of the spiral organization of the cell wall. The breaking load in tension of single tracheids taken from successive growth rings of two stems was also measured and found to increase with increasing cell length. Failure in tension occurred in the cell wall. In specimens of late wood the line of failure followed the direction of micellar orientation of the middle layer of the secondary wall. This was also observed for early-wood specimens although the line of failure was often irregular. Within the cell wall, separation between the outer and middle layers of the secondary wall, and the outer layer of the secondary wall and primary wall, usually occurred during failure. This has been attributed to the differences in micellar orientation and the relative extent of the micellar and inter-micellar systems of the adjacent cell-wall layers. It has been concluded that the breaking load in tension of the wood sections was governed by the cell-wall organization of the constituent cells and by the basic density of the specimens. The increase in the breaking load in tension which occurred upon drying was attributed primarily to changes in the inter-cellular layer (middle lamella), because the breaking load of isolated tracheids was less in the dry than in the water-saturated condition. It was demonstrated that an increase in radial growth rate of the stem resulted in a decrease in the average tracheid length. This was paralleled by a decrease in the breaking load in tension of the wood. The possible applications of the investigations in forest practice are briefly discussed. *Author's summary.*

4170. ISENBERG, I. H. **Fiber measurements of tropical wood fibers.** *Tappi* 35 (4), 1952 (145–7). 27 refs. P.R.

Gives dimensions of fibres and vessel segments for 12 species of tropical American hardwoods and Burma Teak.

4171. ALMEIDA, D. GUILHERME DE, ARAUJO, P. A. DE MATOS, and BARROS, E. PINTO DE. Comprimento de elementos fibrosos—micrometria comparada entre vinte e duas espécies botânicas. [**The dimensions of wood fibres: comparative measurements of twenty-two species.**] *Arq. Serv. flor., Brasil* 4, 1950 (7–85). 18 refs. [Port.port.f.e.]

Fibre lengths of 22 Brazilian species were measured in order to obtain some indication of their wood pulp potentialities. For each species the shape of the fibres is shown by microphotographs, and their size-frequency is given in curves. A classification of the species according to fibre length is presented.

4172. ITŌ, M., and KISHIMA, T. **Studies on the tyloses—their occurrence in the domestic wood.** *Repr.* from *Wood Research Review, Japan* 1951 (3), (44–55). 9 refs. [Jap.e.] [Wood Research Institute, Kyoto University.] P.R.

This investigation showed that tyloses are found in the sapwood of almost all species that have particularly well developed tyloses in the heartwood. In some species (*Juglans sieboldiana* var. *cordiformis, Quercus acutissima, Ulmus japonica, Mora bombycis, Robinia pseudoacacia*, and *Rhus javanica*) they are found even in the outermost rings adjacent to the bark. Data on the presence or absence of tyloses in heartwood, sapwood, and outermost rings, are tabulated for 109 Japanese species belonging to 69 genera.

811.2. Special Features and Abnormal Structure

4173. SINNOTT, E. W. **Reaction wood and the regulation of tree form.** *Amer. J. Bot.* 39 (1), 1952 (69–78). 11 refs. O.B.D.

Cf. *For. Abstr.* 13 (Nos. 2411, 3698, 3701.)

811.4. Growth Rings. Early and Late Wood
See Nos. 3701, 4230.

811.5. Sapwood and Heartwood
See also No. 4172.

4174. **Physiology of heartwood formation.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (10–1).

An experimental girdling technique has been worked out at Princes Risborough for interrupting the flow of sap without seriously interfering with the vitality and normal physiological activities of the tree. Observations so far show that some, but not all, of the changes that occur in normal heartwood formation can be induced in this way. It is too early to say whether results will lead to the discovery of a practical method of accelerating the change from sapwood to heartwood or of increasing the heartwood % in commercial timber.

4175. CHATTAWAY, M. M. **Project W.S. 7. Investigation of sapwood-heartwood transformation. Progress report No. 3. Experiment W.S. 7/3. The occurrence of a special form of heartwood crystal in certain timbers. (First report.)** Division of Forest Products, Commonwealth Scientific and Industrial Research Organisation, Melbourne. 1951. pp. 10 + 21 photos, 7 dgms. 1 ref. P.R.

Crystals of a characteristic shape and colour have been observed in the heartwood of woods of 19 different families. They have never been seen in sapwood. The crystals, which may occur in any tissue of the heartwood, have in many different woods been found in close association with fungal hyphae. Their distribution has been studied intensively in *Eucalyptus hemiphloia* and *E. sideroxylon*, in which species they occur from the base of the tree to the upper limit of the heartwood. In a random selection of discs from other species of the genus *Eucalyptus*, the crystals occur from the pith to a short distance from the outer edge of the heartwood. Further research is needed for identification of the fungi with which these crystals are associated, and to determine the chemical composition of the crystals and of the heartwood extractives of the woods in which they occur. [Cf. *For. Abstr.* 13 (No. 2408).] *From author's summary.*

4176. MÖLLER, C. M., and GRAM, K. Mørk kerne hos ask. [**Dark heartwood in Ash.**] *Dansk Skovforen. Tidsskr.* 36 (8), 1951 (414–36). 7 refs. [Dan.dan.e.]

Tests of bending and tensile strength were made on 181 heartwood samples from 80 trees to determine whether wood from trees with normally light and with dark heartwood was equally strong. The dark heartwood samples showed slightly lower average bending and tensile strengths than the light, but the difference so little exceeded the mean error that it may be only apparent. The length of the break and the deflection at breaking point were generally rather larger for the light samples, but the figures were so variable that no definite conclusions can be drawn. An anatomical examination showed no difference in cell structure, and staining tests no difference in lignification, between dark and light samples. Tyloses, although fewer in number than in a species with typical heartwood, were found to appear early, often in the next-to-outermost annual ring; the wood consists, therefore, of a few annual rings of sapwood surrounding a heartwood of the same colour, and the dark heartwood must be characterized as false heartwood. The dark colour was found to fade as the wood dried out.

811.6. Texture. Grain. Figure
See Nos. 4364–5.

812. *Physical and Mechanical Properties*

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties
See also Nos. 4301, 4303.

4177. MAKU, T. **Heat conduction in wood. III. Relation between the moisture content and the heat conduction vertical to the grain.** *Wood Res., Kyoto* No. 6, 1951 (43–50). 1 ref. [Jap.e.] X.

A study was made to determine the relation between the moisture content and the thermal diffusivity of heartwood of *Fagus crenata* and *Cryptomeria japonica*, when treated by steam at 90–100° C. and by water at 65° C. It was found that thermal diffusivity decreased as the moisture increased below fibre-saturation point, but is constant at about 50% and above. The value of the coefficient of heat transfer is so large for the hot-water treatment of wood with a planed surface, that the interior temperature is about equal to that in steaming. [Cf. *For. Abstr.* 12 (No. 366).]

4178. **Dielectric properties of wood.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (14–5).

Measurements have been made of the dielectric constant and power factor for the three principal directions of the grain on discs of 12 species, conditioned to relative humidities (r.h.) of 30, 60 and 90%. Both dielectric constant and power factor are greater in some species considerably so, in the longitudinal than in the transverse directions, and are usually slightly greater for the radial than for the tangential direction. The dielectric constant in all three directions falls with increasing frequency over the range examined (2 kilocycles/sec. to 40 megacycles/sec.). The curve of power factor against frequency, however, shows a minimum at a frequency which rises as the moisture content increases. At a given frequency and moisture content the dielectric constant is proportional to density for all three grain directions; this is as yet unexplained. There is little or no correlation between density and power factor, and when power factor is plotted against moisture content the curve is divided into three distinct regions, the power factor increasing from 0–8% moisture content, remaining steady or decreasing between 8 and 14%, and increasing above 14%. The conductivity of the wood is proportional to the product of frequency, dielectric constant, and power factor; and the irregular behaviour of the power factor is reflected in similar, though less marked, irregularities in the conductivity. In all three directions, at the lower humidities, the logarithm of the conductivity is proportional to the

logarithm of the frequency over a certain frequency range which becomes smaller as the moisture content increases (50 kilocycles/sec. to 40 megacycles/sec. for specimens conditioned to 30% r.h., and 500 kilocycles/sec. to 40 megacycles/sec. for specimens conditioned to 60% r.h.). On specimens conditioned to 90% r.h. the change of conductivity with frequency is much less.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 4177–8, 4323.

4179. **Control of moisture content and shrinkage of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–7, 1951. pp. 15 + 6 dgms., 2 gphs., 4 tbls., 1 map. 13 refs. P.R.

Includes chapters on equilibrium moisture content (m.c.); shrinkage of wood; design factors affecting shrinkage in the structure; seasoning, storage, and care of lumber; and determination of m.c. Tables are appended of: relative humidity and equilibrium m.c.; recommended m.c. values for various wood items at time of installation; shrinkage values for commercially important woods grown in the U.S.A.; and average m.c. of green wood.

4180. **Resin-coated nails for use with resistance-type electric moisture meters.** [*Bienn.*] *Rep. Ore. St. For. 1948/49–1949/50*, [1950] (75).

It was found that after applying two coats of either of two resins [not specified] to nails, and baking each coat for 24 hours at 135° C., the nails could be driven into wood to the desired depth, and pulled out without breaking the coating. Further study showed that these resin-coated nails can be used to determine the moisture content of wood to any desired depth, even though the surface of the wood may be wet.

4181. **Wood-water relationships.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (12–3). 1 ref.

Results of measurements of the relative-humidity/moisture-content isotherms of Sitka Spruce are shown in graphs, where adsorption and desorption curves correspond to moisture content from dryness to 32·5% and back again. These curves appear to be completely stable and reproducible. The effect of putting the wood through smaller moisture-content cycles (from 0 to 11·2 and 19·7% respectively and back to 0, and from 32·5% to 14·1% and back to 32·5%) was also studied. It appears possible, from these results, that an equilibrium point anywhere within the normal hysteresis loop may be obtained by putting the wood through a suitable intermediate humidity cycle. When samples are being conditioned, one of these intermediate equilibrium states may result if the final and initial moisture contents do not differ greatly. For accurate work it may therefore be necessary to put the wood through a preliminary conditioning treatment to ensure that the final state really corresponds to a point on the main adsorption or desorption curves.

4182. **Shrinkage.** *Rep. imp. For. Inst. Oxf. 1950/51*, 1952 (18–9).

An investigation was made of the shrinkage of ray and ray-free tissue dissected from sections of three woods with large rays. It was found that the ray tissue shrank significantly less than the other tissues radially, but more longitudinally. A technique was developed for measuring this difference by the curvature of thin strips of sections containing varying proportions of ray tissue down one side. This produces curvature in proportion to the amount of ray tissue included. Large rays in dried cross-sections showed bulging perceptible on the tangential edges, compared with the edge of the intervening tissues. This technique was applied to the smaller rays of *Carapa* and *Swietenia*, and the results indicated that the ray-free tissue also shrinks less radially than tangentially. Both radial and tangential shrinkage were greater in *Carapa* than in *Swietenia*.

4183. RITTER, G. J., and MITCHELL, R. L. **Fiber studies contributing to the differential shrinkage of cellulose.** *Paper Industry, Mount Morris, Ill.* 33 (10), 1952 (1189–93). 12 refs. B.P.I.R.A.

Data have been presented to show that isolated ray cells shrink and swell in their longitudinal direction, which is the radial direction of wood, to the same extent as does the wood from which they were isolated. Data are also included to show that the chemical removal of ray cells from woods does not modify the shrinkage and swelling of the wood. These findings are in agreement with previously reported microscopical and X-ray data, but they are at variance with the earlier belief that ray cells restrain radial shrinking and swelling. Greater shrinking and swelling of the dense summerwood than that of the springwood in the tangential direction was shown to account for only a small part of the greater tangential than radial shrinking and swelling. It was shown that the difference between radial and tangential shrinking and swelling can be accounted for on the basis of the crystallite structure being bent around the pits, which are predominantly in the radial wall. This structure introduces a longitudinal component into the dimensional changes of the radial wall and thereby lessens radial shrinking and swelling. The primary-layer cellulose crystallites, which are arranged parallel to the transverse perimeter of the fibres, restrain external shrinkage of the fibres. This restraining effect increases with increased size of the fibre lumen; accordingly, the external shrinkage of the wood decreases, in general, with decreasing specific gravity of the wood. *Authors' summary.*

4184. CHRISTENSEN, G. N., and WILLIAMS, E. J. **Diffusion in wood. I. A quantitative theory of diffusion in porous media and its application to wood.** *Aust. J. appl. Sci.* 2 (4), 1951 (411–29). 17 refs. P.R.

Previous investigations into diffusion of water-soluble compounds through wood are reviewed briefly and the application of Fick's laws to diffusion through a porous medium such as wood is discussed. It is shown that for diffusion under non-steady-state conditions, it is not possible to characterize the diffusion system completely in terms of the single diffusion coefficient D determined at the steady state. A second parameter k, called the 'pervious fraction',

is necessary, together with a diffusion coefficient D' such that $D = kD'$. The pervious fraction is a function of the volume occupied by the solute and solvent within the porous medium. In studying the application of the above concepts to diffusion in wood, measurements of the rate of diffusion of NaCl through wood laminae and into wood blocks have been made. For diffusion through laminae, close agreement with Fick's law was observed. In the case of the wood blocks, change in moisture distribution during diffusion was a complicating factor. There is some evidence that not all the water present in the wood is capable of acting as a solvent for the diffusing solute. *Authors' summary.*

4185. CHRISTENSEN, G. N. **Diffusion in wood. II. The temperature coefficient of diffusion through wood.** *Aust. J. appl. Sci.* 2 (4), 1951 (430–9 + 8 photos). 10 refs. P.R.

The temperature coefficient of diffusion of NaCl through heartwood samples of three timber species [*Eucalyptus maculata, E. regnans, Araucaria cunninghamii*] has been determined over a range of temperature from 20 to 50° C., and in each of the three directions relative to the grain. For transverse diffusion in the two hardwoods tested, temperature coefficients were considerably greater than for diffusion in solution. An explanation in terms of the activation concept of diffusion is suggested. Development of this concept leads to the conclusion that high temperature coefficients may be indicative of the presence of narrow capillaries in the diffusion path. Both the rate of diffusion and the temperature coefficient of diffusion may be used in characterizing the capillary structure of wood. *Author's summary.*

4186. CHRISTENSEN, G. N. **Diffusion in wood. III. Ion selection and its effect on the diffusion of electrolytes.** *Aust. J. appl. Sci.* 2 (4), 1951 (440–53). 5 refs. P.R.

A study of the selective action of wood on ions diffusing through it has been made by measuring the rates of diffusion of electrolytes with (*a*) a series of univalent and bivalent cations and a common anion Cl', and (*b*) a series of univalent and bivalent anions with a common cation K^+. The rate of diffusion of HCl at varying concentration has also been determined together with its effect on the permeability of the wood. The rate of diffusion through wood of solutes containing either a bivalent anion or cation was generally only a fraction of that for uni-univalent electrolytes. This effect is explained as due to restriction on the diffusing anion by charged negative groups arising in the narrow capillaries from dissociation of carboxyl groups. This is consistent with the explanation advanced in Part II of this series for the temperature coefficient of diffusion through wood and its relation to wood structure. That the anion was the restricted ion was confirmed from measurement of concentration potentials across wood membranes. The conclusion is reached that in its behaviour towards diffusing electrolytes, the wood acted as a negatively charged semi-permeable selective membrane. The extent to which this behaviour was manifested varied with the type of wood and the direction of diffusion relative to the grain. *Author's summary.*

4187. **Passage of liquids through wood.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (20–1).

In order to investigate moisture gradients and to determine an optimum moisture-content average for various kinds of vat and barrel staves, shallow trays have been made from various species and thicknesses of wood. The trays are kept filled with water and the undersides are fully exposed to the drying effect of air of different humidities. After long, varying periods of exposure, the trays are cut open and moisture-distribution tests are made across the section. Results so far have shown that a high moisture concentration tends to form near the wetted face but that the bulk of the timber assumes moisture values not much above the equilibrium moisture content on the face exposed to the air.

The effects of hygroscopic liquids on the moisture gradients and the expansion or shrinkage of barrel and vat staves is also being investigated. A load of 3-in. *Afzelia* is being seasoned to determine whether it will prove a suitable substitute for the softwoods usually used in vat-making, when seasoned to an average moisture content of 15%.

4188. **Diffusion of water vapour through wood.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (13–4). 1 ref.

Specimens measuring 4 × 4 in., of three thicknesses ($\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ in.), were dried to constant weight over P_2O_5, then exposed to an atmosphere of 30% relative humidity, and the rate of moisture uptake was determined. The diffusion coefficients thus obtained were found to depend on thickness, and as it was suspected that diffusion of moisture through the edges and along the grain was responsible, the edges were coated with moisture-proof paint before the specimens were exposed to an atmosphere of 60% r.h. The calculated diffusion coefficients were this time independent of thickness, thus lending support to the theory that edge diffusion caused the anomalous results of the first experiment. After reaching equilibrium at 60% r.h. the specimens were exposed to an atmosphere of 90% r.h. The calculated diffusion coefficients were larger than the previous ones, indicating that the diffusion coefficient increases with increasing moisture content, and were again independent of thickness. The specimens are now being taken through the desorption cycle, on completion of which the results will be analysed. Further measurements have been made using the Perspex vessels already described [see *For. Abstr.* 13 (No. 2418)]. Results are being tabulated and compared and it is hoped to incorporate them in a preliminary report.

4189. OGURA, T. **Study on the mechanism of wood drying. 2. On the moisture-conductivity and the diffusion-coefficient.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 45, 1950 (55–69). 15 refs. [Jap.e.]

Several equations, deduced for the distribution of moisture and its changes, have been found to be in good agreement with the experimental data [cf. *For. Abstr.* 12 (No. 591)]. The value of the diffusion coefficient was found to be more or less constant, independent of the thickness and moisture content.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 3634, 4230, 4270, 4282.

4190. PILLOW, M. Y. **Simplified procedure for determining oven-dry specific gravity of flitches and bolts.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1790, 1951. pp. 4 + 2 photos. 1 ref. P.R.

A practical method by which the veneer for aircraft structural plywood can be produced with reasonable assurance that it will meet the minimum sp. gr. requirement. The method consists in determining the sp. gr. of flitches and bolts before the veneer is cut: blocks of oven-dry wood 1·00 × 2·00 × 3·05 in. (volume 100 c.c.) or 1·00 × 2·00 × 6·10 in. (volume 200 c.c.) are weighed and the weight in grams is divided by 100 or 200 as the case may be.

4191. REED, J. M., and REID, J. S. **Variation in density of air-dry sap Rimu.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (2), 1951 (16–9).

An average density of about 34 lb./cu. ft. was found for material containing no heartwood, from all parts of the country. There are no substantial differences in mean density between non-heart Rimu from Westland, from Southland and from the North Island.

4192. KANTOLA, M. Saha- ja vaneritukkien kuutiojalkapaino. **[The weight of sawlogs and veneer logs per cubic foot.]** *Metsät. Aikak.* 1952 (1), (23–5). [Fi.e.]

Results of measurements on logs in summer and winter showed that there was little difference in average density between barked and unbarked softwood logs measured in summer and winter and Birch logs measured in winter; their average weight was 29–30 kg./cu. ft. The weight of Birch logs felled in summer, left untrimmed to season, and measured the following summer, averaged ca. 24 kg./cu. ft. *From author's summary.*

812.7. Strength Properties

See also Nos. 3643, 4169, 4176, 4231, 4246–8, 4270, 4282, 4291–2, 4300–1, 4384–5.

4193. PEARSON, R. G. **The sampling of timber for standard mechanical tests.** *Aust. J. appl. Sci.* 3 (1), 1952 (25–52). 9 refs. P.R.

The general principles of selection of material are followed by a discussion on the size of sample required for various purposes. This depends upon the precision required and the variability of the species. A number of charts and formulae are given for determining the size of sample to estimate species means and lower probability points of the frequency distribution with stated precisions. *From author's summary.*

4194. **Timber mechanics: test methods.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (23–4).

Discusses testing methods, the relative advantages of samples with cross-sections 2 in. and 2 cm. square, and the findings of recent international conventions, held under the auspices of F.A.O., on a standardized scheme of testing.

4195. **Abrasion.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (25).

The effect of different drying treatments on wearing qualities of home-grown Oak has been investigated. Abrasion tests indicate that neither the relatively high temperature used in kiln-drying nor an appreciable over-drying to a low moisture content followed by re-wetting, reduces resistance to wear.

4196. WINTER, H., and DASKALOFF, I. Festigkeitseigenschaften und elastisches Verhalten von Buche. **[Strength properties and elastic behaviour of Beech wood.]** *Holz Roh- u. Werkstoff* 10 (1), 1952 (6–12). 15 refs. [G.g.] P.R.

Summarizes data available in German literature since 1922.

4197. **Effect of temperature on shear moduli of Beech.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (16–8).

Results of measurements of the shear moduli in the three principal planes—transverse or radial-tangential (RT), tangential-longitudinal (TL), and radial-longitudinal (RL)—on strips of Beech exposed to different temperature cycles at constant relative humidities are shown in graphs. The observations have been represented by a straight line; there is some evidence of curvature at the higher humidities but it is small and hardly greater than experimental error. Assuming a straight-line relationship, the equation for shear modulus is $G_T = G_t\ [1 - a\,(T - t)]$, where T and t are temperatures in °C., T being the higher. Values of the temperature coefficient are tabulated; it increases rapidly at high humidities and at a given humidity the temperature coefficient of G_{RT} is rather higher than that of G_{TL} and G_{RL}. The % change in the temperature coefficient for a 10° change in temperature is also shown in the table.

4198. SCHAEFER, W. Die Zugfestigkeit lamellierter Stäbe. **[Tensile strength of laminated bars.]** *Holz Roh- u. Werkstoff* 10 (1), 1952(15–8). [G.g.] P.R.

Results of experiments conducted in 1943 in three German laboratories. It was found that when a tension bar is made of several lamellae, the breaking stress in relation to the total cross-section is less than the average value calculated from values for the individual lamellae, often even less than the value for the weakest lamella. A 'calculated value' depending on the number of lamellae, can be derived statistically for the evaluation of tensile bars, but this value leads to premature breakage in 4% of all cases. It is thus better to use the 'minimum value'.

813. *Wood Chemistry*

See also Nos. 4163–4.

4199. HÄGGLUND, E. **Chemistry of wood.** Academic Press Inc., New York. 1951. p. x+631. 1934 refs. Price $13.50. P.R.

Includes sections on: wood tissue; physical properties of wood; wood components and their chemical properties; decomposition of wood by acids and

wood saccharification; pulping of wood with solutions of SO_2 and sulphites; pulping of wood by aqueous alkalis; other methods of pulping; delignification with bleaching agents; carbonization of wood; utilization of wood by caustic fusion, pressure heating with alkali and digestion with tars or phenols; behaviour of wood during storage, and natural decomposition of wood.

4200. Bailey, I. W. **Biological processes in the formation of wood.** *Science* 115 (2984), 1952 (255–9). 3 refs.

A paper read in a symposium on 'The Chemistry of Wood', Cellulose Division, American Chemical Society, New York, September 1951.

4201. Stewart, C. M., Foster, D. H., Cohen, W. E., Leslie, R. T., and Watson, A. J. **Project C1—Methods of wood and pulp analysis. Subproject C1–1—Preparation of wood sample for analysis. Progress report No. 7. The selection and preparation of a reproducible wood sample for chemical studies.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organisation, Melbourne. 1951. pp. 57 + vi + 15 gphs., 4 tbls., 1 map. 54 refs. P.R.

Samples of outer heartwood from butt logs of 20 trees were collected at random from all stands of *Eucalyptus regnans* in Central Victoria. Centre and top log samples were also collected, but from five trees only. Each of these samples was converted to shavings (during which conversion the majority of fibres were cut or broken) and then extracted successively with water (24 hr. at 20° C.), ethanol (24 hr. at 55° C.) and water (24 hr. at 55° C.). After analysis of each extracted sample had established the efficiency of each extraction, all samples were mixed in water to provide a composite sample which may be reproduced within specified limits of accuracy. The preparation of this first reproducible sample will facilitate the correlation of the results of current investigations with those of the future. Holocellulose, lignin (Klason), pentosan, and methoxyl-in-holocellulose were determined on each individual extracted sample. The data thus obtained have been used to calculate the number of trees necessary for the preparation of a reproducible sample, the selected properties of which fall within specified limits of accuracy. The results are presented in the form of charts. No evidence has been found of variation between samples from the different localities within the chosen area. Generally, variations were greater between-tree than within-tree. Although most samples contained less than 1% of cold-water solubles, a few contained 5–10%. Warm alcohol removed an additional 1–7%, and a further 1–4% was soluble in warm water. Holocellulose content varied from 75 to 82%; lignin, 20–27%; pentosan, 13–20%; methoxyl-in-lignin, 19–23%, and methoxyl-in-holocellulose, 1–2%. Significant correlations have been established between pentosan content and height up the tree, and between lignin content and the following: total extractives, age of tree, methoxyl-in-lignin, and methoxyl-in-holocellulose. The older trees had more growth rings of sapwood than the younger; consequently the outer heartwood from the former was older (up to 6 years). This may account, at least in part, for the correlation between lignin content and age of tree. Sulphate pulps were prepared under identical conditions from various samples. Yields varied considerably, and a decrease of ca. 20% in average whole-fibre length was sustained as the result of pulping. The procedure for the preparation of a *representative* composite sample, of which the mean will fall within the specified limits of the species mean, is outlined. A procedure for collecting future reproducible samples is briefly discussed. *From authors' summary.*

4202. **Research on wood analysis.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (42–3).

Discusses results of research on the mechanism of delignification by buffered NaClO.

4203. Wise, L. E. **The chemical characteristics of tropical woods.** *Tappi* 35 (4), 1952 (142–5). 15 refs. P.R.

Summarizes the results of comprehensive chemical studies on 17 tropical (mostly American) woods, conducted at the Institute of Paper Chemistry, Appleton, Wis. *Ocotea rubra* (*a*) is chosen as representative of tropical woods and compared with *Quercus rubra* (*b*). Two sets of summations of chemical composition are given, corresponding to the two possible ways of defining 'α-cellulose'. (*a*) has been found to be much higher in lignin and much lower in hemicelluloses and acetyl value than (*b*). The methoxyl content of the lignin in (*a*) is also lower. In the other set of figures, the xylan content of (*a*) is lower than that of (*b*); the methoxyl content of the whole wood of (*a*) is higher than in the common temperate hardwoods, and the α-cellulose content is high. Comparison with data obtained by other authors does not give a consistent picture, and it is difficult to establish any common trends for tropical hardwoods as a whole, if only because of the different analytical methods used by various authors. Factors of site, soil type, rainfall, altitude etc., will also play an important role. [Cf. *For. Abstr.* 12 (No. 1175).]

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 4183, 4408.

4204. Brauns, F. E. **The chemistry of lignin.** Academic Press Inc., New York. 1952. pp. xv + 808 + 9 photos. 3021 refs. Price $14·50. P.R.

Includes sections on: evolution of lignin chemistry; definition and distribution of lignin; colour reaction of lignified materials; lignin isolation, determination, physical properties, elementary composition and constituent groups; acylation and acylysis; alkylation; halogenation; nitration; sulfonation; hydrolysis; alcoholysis; mercaptolysis; phenolysis; reduction, hydrogenation, and hygrogenolysis; oxidation; alkali fusion; thermal decomposition; biological decomposition; theories on lignin structure; linkage in the plant; theories on lignin formation and synthetic lignins; and an author and subject index.

4205. Yamashita, T. **Studies on lignin. (1) On the ultraviolet absorption spectrum of gymnosperm**

lignin and its analogs. *Bull. For. Exp. Sta. Meguro, Tokyo* No. 45, 1950 (147–52). 11 refs. [Jap.e.]

This spectrum was found to be different from that of the synthetic lignin analogue. [Cf. *For. Abstr.* 10 (No. 1883).]

4206. READ, D. E., and PURVES, C. B. **Isolation of penta- and 1,2,4,5-benzene-tetracarboxylic acids from [Black Spruce and Poplar] wood lignins oxidized with alkaline permanganate.** *J. Amer. chem. Soc.* 74 (1), 1952 (120–3). 22 refs. O.R.S.

4207. LEOPOLD, B. **Studies on lignin. III. Oxidation of wood from *Picea abies* (L.) Karst. (Norway Spruce) with nitrobenzene and alkali.** *Acta chem. scand.* 6 (1), 1952 (38–48). 19 refs. [E.e.] [Kungl. tekniska Högskolan, Stockholm.] O.R.S.

4208. LEOPOLD, B., and MALMSTRÖM, L.-L. **Studies on lignin. IV. Investigation on the nitrobenzene oxidation products of lignin from different woods by paper partition chromatography.** *Acta chem. scand.* 6 (1), 1952 (49–54). 10 refs. [E.e.] O.R.S.

The nitrobenzene oxidation products from the wood of 27 conifers and 3 hardwoods was studied. The wood from almost all the conifers gave small and varying yields of *p*-hydroxybenzaldehyde. The Taxodiaceae and Pinaceae gave comparatively high and uniform yields. Many conifers, mainly Pinaceae, gave small amounts of syringaldehyde. Total yields of aldehyde were uniform; with three exceptions they ranged between 30·0 and 32·6% based on the methoxyl, and between 26·0 and 28·0% on the lignin, content of the wood. The hardwoods (*Acer platanoides*, *Betula papyrifera* and *Populus* sp.) yielded vanillin, syringaldehyde and little or no *p*-hydroxybenzaldehyde.

4209. WACEK, A. VON, and SCHROTH, D. **Über die Bindung Lignin-Kohlehydrate.** [**The lignin-carbohydrate bond.**] *Papier, Darmstadt* 4 (21/22), 1950 (410–4). [G.] L.S.

A study of the nature of the bond between the residual lignin and cellulose after the main body of the lignin has been removed. The species investigated was *Entandrophragma utile*.

4210. RÅNBY, B. G. **The physical characteristics of alpha-, beta- and gamma-cellulose.** *Svensk Papp-Tidn.* 55 (4), 1952 (118–24). 22 refs. [E.g.sw.] P.R.

An account, illustrated by electron photomicrographs, of research mainly on commercial pulps.

4211. ASUNMAA, S., and LANGE, P. W. **Distribution of the carboxyl groups in the cell wall of Spruce and Birch holocellulose and cotton [determined microspectrographically.]** *Svensk PappTidn.* 55 (6), 1952 (217–23). 20 refs. [E.g.sw.] P.R.

4212. BJÖRKQVIST, K. J., and JÖRGENSEN, L. **Hemicellulose extracted from wood holocellulose [of *Betula verrucosa* and *Picea abies*] swollen in liquid ammonia.** *Acta chem. scand.* 5 (6), 1951 (978–9). 8 refs. [E.] [Billeruds AB, Säffle, Sweden.] O.R.S.

Results showing the yield of hemicellulose and the pentosan and uronic-acid content, and the constituent sugars in the holocellulose and extracted hemicellulose fractions are tabulated. They differ considerably from results obtained by direct alkaline extraction of unswollen wood hemicellulose.

4213. JENSEN, W. **Institutet för träkemi vid Åbo Akademi: verksamheten 1951–52.** [**The Institute of Wood Chemistry at Åbo Academy: work during 1951–2.**] *Pap. ja Puu* 34 (4*a*), 1952 (157–9). [Sw.e.] P.R.

The work reviewed covers studies on the chemistry of the inner and outer bark of Birch [cf. *For. Abstr.* 12 (No. 2232)], fusel oils from sulphite mills, and sulphate and sulphite pulping of Birch [cf. *For. Abstr.* 13 (No. 2597).]

4214. CARVALHO, J. DA SILVA. **Estudo químico-analítico da madeira de *Quercus suber* L.** [**Chemical analysis of the wood of *Q. suber*.**] *Publ. Serv. flor. aqüic. Portugal* 15 (1/2), 1948 (25–40). 19 refs. [Port.e.]

Wood from the middle third of the stem of a 25-year-old tree was found to have a high hemicellulose content and a high % of Cross and Bevan cellulose (about 59%). It appears, therefore, to be very suitable for pulping.

4215. LAWTON, E. J., BELLAMY, W. D., HUNGATE, R. E., BRYANT, M. P., and HALL, E. **Studies on the changes produced in wood exposed to high velocity electrons.** *Tappi* 34 (12), 1951 (113*A*–116*A*). 15 refs. P.R.

[Cf. *For. Abstr.* 13 (No. 1535).] The cellulose in Basswood [*Tilia* spp.] exposed to sufficient doses of ionizing radiation ($1·0 \times 10^8$ equivalent röntgen units) becomes largely available for rumen bacteria. The irradiated wood has a food value approximately equal to that of hay for rumen bacteria. Studies of cellulose and lignin as well as wood indicate that cellulose is more readily broken into soluble products by ionization radiation than lignin. Cellulose is depolymerized to reducing sugars which are in turn destroyed by higher doses. The results do not support the view that lignin is an 'encrusting layer' around cellulose in Basswood. *From authors' conclusions.*

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also No. 4175.

4216. BERKEL, A., and HUŞ, S. **Türkiye çam türlerinden kızılçam (*Pinus brutia*) ve karaçam (*Pinus nigra* var. *pallasiana*) gövde odunu içerisindeki ham terebantin miktarları ve yayılışı hakkında araştırmalar.** [**Research on the resin content of the stem wood of the Turkish Pines, *P. halepensis* var. *brutia* and *P. nigra* var. *caramanica*.**] *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (2), 1951 (68–86). 8 refs. [Turk.g.]

Four trees of *P. halepensis* var. *brutia* and three of *P. nigra* var. *caramanica* were felled and left for 6 months before samples of heartwood and sapwood were taken and the resin extracted from wood meal of these with alcohol. The average resin contents for *P. h. brutia* were 2·74% for sapwood and 18·96 for heartwood, with a mean for the two types of wood of 7·32; corresponding figures for *P. n. caramanica* were respectively 3·21, 10·25 and 4·68. In sapwood of *P. h. brutia* the resin content decreased radially outwards; the same was true of the lower part of the stem in *P. n. caramanica*, but in the upper

stem there was no regular gradient in resin. Neither species showed any regular radial variation in resin content of the heartwood. In both species there was a slight increase in the resin content of sapwood with increasing height in the stem, but no regular variation in the heartwood. *From authors' summary.*

4217. GOTTLIEB, S., and BRAUNS, F. E. **Occurrence of *d*-pinitol in Red Spruce (*Picea rubra*).** *J. Amer. chem. Soc.* 73 (12), 1951 (5880). 11 refs. O.R.S.

During preparation of 'native lignin' from *P. rubens*, a crystalline compound identified as *d*-pinitol was isolated in yields of 25 g. from 100 lb. sawdust.

4218. KING, F. E., JURD, L., and KING, T. J. ***iso*Taxiresinol (3′-demethyl*iso*laricresinol) a new lignan extracted from the heartwood of the English Yew, *Taxus baccata*.** *J. chem. Soc.* Jan., 1952 (17–24). [The University, Nottingham.] O.R.S.

A hitherto unknown lignan containing 3 phenolic hydroxyl and one methoxyl groups has been isolated from the heartwood of *T. baccata*. A *meso*inositol monomethyl ether, with the same properties as sequoyitol from *Sequoia sempervirens* has also been obtained. *From authors' summary.*

4219. STEPHEN, A. M. ***Acacia mollissima* Willd. II. Extractives from the wood.** *J. Sci. Food Agric.* 3 (1), 1952 (37–43). 26 refs. O.R.S.

A preliminary survey shows that there are wide variations in the yield of extractives from different trees grown in a single plantation. [Cf. *For. Abstr.* 13 (No. 822).]

4220. **Chemical examination of secondary colonial timbers.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (44).

Further work on the sapogenin obtained on hydrolysis of the saponin of Morabukea [*Mora gonggrijpii*] has confirmed its identity as oleanolic acid [cf. *For. Abstr.* 13 (No. 1541)]. Yields of saponin and of oleanolic acid were 4·3 and 0·78% respectively by weight of original oven-dry wood.

4221. **The extractives of 'Rhodesian Teak' (*Baikiaea plurijuga*).** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (44–5).

Preliminary tests to determine the constituents causing the resistance of *B. plurijuga* to fungal decay have indicated that, after isolation, the water- and alcohol-soluble extractives are not appreciably toxic to cultures of wood-destroying fungi on agar media; tests using other media are in progress. On extraction with acetone, the wood yielded 8·6% tannin and 9·3% dark red phlobaphene. [Cf. *For. Abstr.* 13 (No. 648).]

4222. KING, F. E., KING, T. J., and SELLARS, K. **The chemistry of extractives from hardwoods. Part V. The isolation of 3:7:4′-trimethylquercetin (ayanin) from the heartwood of *Distemonanthus benthamianus*.** *J. chem. Soc.* Jan., 1952 (92–5). O.R.S.

Cf. *For. Abstr.* 13 (Nos. 648–9).

4223. KING, F. E., KING, T. J., and WARWICK, A. J. **The chemistry of extractives from hardwoods. Part VI. Constituents of Muninga, the heartwood of *Pterocarpus angolensis*, A.:6:4′-dihydroxy-5:7-dimethoxy*iso*flavone (Muningin).** *J. chem. Soc.* Jan., 1952 (96–100). O.R.S.

4224. BALLOU, C. E., and PERCIVAL, E. G. V. **Wood starches. Part II. The structure of the sapwood starch of the Maple (*Acer* spp.).** *J. chem. Soc.* March, 1952 (1054–6). O.R.S.

Cf. *For. Abstr.* 13 (No. 2447).

813.3. Ash Constituents

See also No. 4164.

4225. AMOS, G. L. **Some siliceous timbers of British Guiana.** *Carib. For.* 12 (3; 4), 1951 (133–7; 139–40). 6 refs. [E.Span.e.]

Forty-seven timber species were examined for SiO_2 content; the results are listed. Of these 13 were highly, 8 moderately, and 26 inappreciably siliceous. The species accumulating SiO_2 belonged to 4 genera only—*Parinari*, *Eschweilera*, *Licania* and *Pouteria*.

813.5. Reaction with Metals

4226. **The use of wood in association with metals.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (46–7).

Discusses general conclusions on corrosion by wood of metals, especially aluminium, from observations made at Princes Risborough over a period of years. The following recommendations are made for wood/aluminium assemblies: (1) The wood should be seasoned before assembly and kept as dry as possible during service. (2) Where wetting of the wood during service is probable, all metal parts in direct contact with it should be coated with bitumen or some other electrically neutral barrier. (3) Woods which, when wet, engender a pH substantially less than 5·0 or above 7·0 should be avoided unless dryness during service can be ensured. (4) Composite structures using wood and aluminium should be designed to avoid bi-metallic action.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

See Nos. 4229, 4298, 4301, 4334.

813.8. Poisonous and Irritant Properties

See also No. 4315.

4227. SCHWEISHEIMER, W. **Wood dust and respiratory diseases.** *Wood* 17 (5), 1952 (181).

Discusses some cases in the woodworking industries of irritation to the respiratory organs and to the skin caused by wood dust. [Cf. *For. Abstr.* 13 (No. 3343).]

4228. DANTIN-GALLEGO, J., ARMAYOR, A. F., and RIESCO, J. **Some new toxic woods: some manifestations of toxicity.** *Industrial Medicine and Surgery, Chicago* 21 (2), 1952 (41–6). [Instituto Nacional de Medicina y Seguridad del Trabajo; Madrid.] D.S.I.R.

A small series of cases is reported involving mill workers handling a shipment of exotic woods

('Caobillas de Guinea', not unlike Mahogany) from Spanish Guinea. Severe reactions (skin and respiratory troubles, asthmatic symptoms) caused closing of the mills. The condition is attributed the inhaling of wood dust, the glucoside content of which gives rise to saponines that act as allergens. It is not known whether the fungi present in many woods, or the chemical action of the wood itself, are responsible for the condition. The irritation is produced only by finely comminuted wood.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 3634–5, 3643, 4221, 4332.

4229. **Chemical effects of weathering on wood in normal and polluted atmospheres.** *Rep. For. Prod. Res. Bd. Lond. 1950*, 1951 (47–8).

The chemical effects and the resulting decrease in mechanical strength, of radiations in the visible part of the spectrum, and ultra-violet and thermal radiations in normal weathering are described, with the accelerated effect produced by SO_2, alone or with NH_3 in polluted atmospheres. Protection of wood by a coating of heat-resisting impervious paint is suggested.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 3698, 4169, 4364.

4230. Susmel, L. Correlazioni fra anelli, zone tardive, tracheidi e peso specifico nel legno di Douglasia. **[Correlations between annual rings, proportion of latewood, tracheids, and density of Douglas Fir wood.]** *Ital. for. mont.* 7 (1), 1952 (30–45). 15 refs. [It.f.]

Data derived from a stem analysis of three young Douglas Firs (two grown fast on fertile soil, and the third more slowly grown on a less fertile soil), are presented and discussed in detail. There appeared to be no constant correlation between width of annual rings and proportion of late wood. The already well known relationship between the length of the tracheids and their distance from the pith and from ground level was confirmed. A correlation was also established between width of annual ring and tracheid length, in accordance with which, at any given distance from the pith and height in the stem, the wider the annual ring, the greater the tracheid length. No correlation was found between density of wood and width of annual ring or proportion of late wood, but there was a relationship between density of wood and the number of tracheids in an annual ring, the density being greatest where the number of tracheids was greatest.

4231. Reid, J. S., and Wilson, M. E. **Some properties of Loblolly Pine (*Pinus taeda*) grown in New Zealand.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (2), 1951 (11–5 + 1 dgm., 5 tbls.).

Results of physical and mechanical strength tests on three trees are discussed and tabulated. Variations in properties with height in tree are shown diagrammatically for one tree.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

4232. **Technische Messe Hannover 1952. [Hanover engineering Fair 1952.]** *Holztechnik* 32 (4), 1952 (164–90, 215–8). [G.] P.R.

List of exhibiting firms, and illustrated descriptions of various exhibits: milling, grinding, and planing machines, fibreboard presses, framesaws etc.

4233. Hvamb, G. Verktøymateriale og verktøyslitasje ved maskinell trebearbeiding. **[Tool materials and tool wear in machine woodworking.]** *Norsk Skogind.* 6 (2), 1952 (45–53). 21 refs. [Nor.e.] [Norsk Treteknisk Institutt.] P.R.

821. *Barking*

See also Nos. 3875–7, 4272, 4377.

4234. Rambo, W. H., and DeRice, H. A. **Economics of log debarking in sawmills.** *Lumberm.* 79 (5), 1952 (94, 96, 132).

Gives estimated costs of sorting, rip-sawing, slab and whole-log barking, and chipping, together with estimated chip recovery.

4235. Anderssons barkmaskin. **[Andersson's barking machine.]** *Skogen* 37 (11*), 1950 (115*). [Sw.]

The machine (illustrated) barks by means of rotating discs controlled by air pressure so that all bark is removed.

4236. **Incisor solves Cedar bark problem.** *Timberman* 53 (6), 1952 (60).

Describes, with illustrations, an incising machine which, by cutting the bark on the log into 12-in. sections, reduces its stringy characteristics and eliminates the clogging of conveyors during the barking process.

822. *Saws and Sawing*

See also Nos. 3556, 3871–3, 3875, 4272 *et seq.*, 4284, 4377.

4237. Fronius, K. Sägewerkmaschinen auf der Technischen Messe Hannover 1952. **[Sawmill equipment at the Technical Fair at Hanover, 1952.]** *Holz Roh- u. Werkstoff* 10 (4), 1952 (138–44). [G.g.] P.R.

Illustrated description of chain saws, frame saws (vertical and horizontal), band saws, circular saws, squaring saws, ripping saws, and sharpening and tooth-setting machines, all of German manufacture.

4238. Karavaev, V. I., and Slavuckiĭ, I. I. Balansirnye pily s reduktornoĭ peredačeĭ. **[Pendulum saws with a reduction gear.]** *Lesn. Prom.* 1950 (9), (18–9). [Russ.]

An illustrated description of a pendulum cross-cut saw in which the usual belt drive is replaced by a reduction gear drive.

4239. Thunell, B. Sågverksteknisk forskning i Sverige. **[Swedish research on sawmilling.]** *Norsk Skogind.* 6 (3), 1952 (76–89). [Sw.e.] [Svenska Träforskningsinstitutet.] P.R.

An illustrated account of work during recent years.

4240. **Sawing research.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (31–4).

Summarizes research on: depth of tooth penetration for band, circular and circular-rip saws; maximum feed permissible for different numbers of teeth; and the volume of sawdust per tooth in relation to gullet space.

4241. ORLOV, M. N. O režimah ramnogo pilenija. **[Schedules of frame-sawing.]** *Lesn. Prom.* 1950 (10; 11), (25–9; 22–7). [Russ.]

A study of the relationships between smoothness of cut (quality of conversion), feed speed, blade thickness, depth of cut, stroke of framesaw, shape and size of teeth and tooth gullets, and tooth pitch; also includes formulae and tables for evaluating the gangsaws and the driving power, when selecting a suitable feed speed. The objective criterion for smoothness of cut is the thickness of layer to be planed off to obtain a smooth surface. Tolerances for this smoothness characteristic and dimensions are tabulated for three qualities of conversion. In evaluating the various relationships through-and-through sawing, slabbing, and resawing of slabbed timber are each considered.

4242. JENKINS, C. E. **Brief review of [machine] saw blades.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 36, 1951. pp. 1. 4 refs. P.R.

Suggests that a hand-filed saw can work better than a machine-filed one, because of the error that hand-filing introduces in the spacing of the cutting edges.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

4243. ISENBERG, H. Rückschlagsichere Fräswerkzeuge mit Spanbegrenzungs-und Abweisringen sowie rundgedrehten, gestuften Segment-Schneidezähnen. **[Moulding tools that do not kick back, with rings for checking and ejecting chips and with circularly-turned, stepped, segmental cutting teeth.]** *Holztechnik* 32 (4), 1952 (221–4). [G.] P.R.

An illustrated description of milling cutters developed by August Oppold, Oberkochen, Germany and suitable for working speeds of 10,000–18,000 revs./min.

4244. J. KOEBERLE SOEHNE A. G., and KOEBERLE, J., SENIOR. **Improvements in cutting tools for wood machining.** *Brit. Patent* No. 664,738, July 27, 1949. pp. 3 + 9 dgms. P.R.

A cutting tool with many cutters for the production of grooves and tenons, mountable in recesses in a cutter disc and individually adjustable in these recesses.

4245. DEXTER & COMPANY (HIGH WYCOMBE) LTD., and MCVEY, G. **Rotary cutter for machinery for working wood or plastics.** *Brit. Patent* No. 665,347, Jan. 23, 1952. pp. 3 + 4 dgms. P.R.

A rotary cutter, comprising a body provided with dovetail-section slots convergent along the block, in which cutters of rectangular section are accommodated and clamped by means of wedges.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

See also No. 4296.

4246. MACK, J. J. **Tests on the holding power of special nails in Radiata Pine.** *Aust. J. appl. Sci.* 2 (4), 1951 (454–63). 3 refs. P.R.

Treated nails had better static and impact holding power than plain nails. Moisture content at the time of driving had a slight and inconsistent effect on holding power, but the drying out of timber after driving reduced holding power.

4247. STERN, E. G. **Straight versus slant driving of nails.** *Timber News* 60 (2154), 1952 (186–7).

Presents the results of tests on the holding power of plain-shank nails and 'stronghold screwnails' driven into green Southern Pine and Hard Maple woods at angles of 90° and 56½°. Both the withdrawal resistance and the lateral load-carrying capacity were determined. It has been found that, in general, the efficiency of the slant-driven nails was decreased in varying degree as compared with the straight-driven ones. The only exception was the case of a pair of nails driven obliquely to each other into Hard Maple, and stressed under lateral load; here the nails developed a wedging action.

4248. MÖLLER, T. En ny metod för beräkning av spikförband. **[A new method of calculating [the strength of] nailed joints.]** *Handlingar, Chalmers Tekniska Högskola, Göteborg* No. 117, 1951. pp. 77. [Sw.sw.e.] P.R.

Fundamental equations are presented for calculating the bearing strength of a nail driven into a single board and loaded with a shearing force acting in the surface plane of the board; with modifications these equations can be used for calculating the ultimate load for joints composed of 2 or more boards. Theoretical values obtained were confirmed experimentally. The practical use of the method is discussed. *From author's summary.*

824.8. Glues and Gluing

See also No. 4284.

4249. **Classification of adhesives.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (27).

Agreement has been reached by the Composite Wood Corresponding Committee of the Commonwealth Conference Standing Committee on Forest Products on the classification of adhesives into: (1) weather-proof, (2) moisture-resistant and (3) interior adhesives. A description of properties is given, with some examples.

4250. **Adhesives; methods of testing.** *U.S. Federal Specification* No. *MMM-A*-175, 1951. pp. 31. P.R.

4251. **Report of committee D-14 on adhesives.** *Prepr. Amer. Soc. Test. Mater.* No. 75, 1951. pp. 8. P.R.

Includes the proposed tentative method of test for effect of bacterial contamination on permanence of adhesive preparations and adhesive bonds. ASTM Designation *D*—51*T*.

4252. Prüfung von Holzleimen. Bindefestigkeit. Allgemeines. **[Testing of glues for wood. Bonding strength. General.]** *Deutsche Normen, Entwurf* No. *DIN* 53251, 1951. pp. 2. [G.] B.S.I.

4253. Prüfung von Holzleimen. Bindefestigkeit von Schäftverbindungen im Zugversuch. **[Testing of glues for wood. Bonding strength of mitre joints in tensile stress.]** *Deutsche Normen, Entwurf* No. *DIN* 53253, 1951. pp. 2. [G.] B.S.I.

4254. HOGAN, J. T., and ARTHUR, J. C., JR. **Preparation and utilization of cottonseed meal glue for plywood.** *Journal of the American Oil Chemists' Society, Chicago* 28 (1), 1951 (20–3). 18 refs. L.S.

4255. SCHULZ, F. Betriebsdaten für Kunstharzleime. **[Working data for synthetic-resin glues.]** *Holz Roh- u. Werkstoff* 10 (4), 1952 (182–4). 1 ref. [G.] P.R.

Contains the following data for 44 synthetic glues and 6 hardeners manufactured by 18 German firms: proprietary name, type (phenolic, urea etc.), solvent, working pressure, time of compression, pressing temperature, extenders.

4256. CARRUTHERS, J. F. S., and THOMAS, A. M. **Investigations into glues and gluing. Progress report 62. The comparative durability of plywood glues in England and in Nigeria (Series IV).** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 11. P.R.

The adhesives tested included those of the phenol-, resorcinol-, melamine-, and fortified and normal urea-formaldehyde type. Plywood for tests was made from 3 × 0·064-in. Beech and Gaboon. Test panels open-piled in a workshop at Princes Risborough showed negligible deterioration of all the glues after 12 months, while panels fully exposed showed incipient deterioration of the urea-formaldehyde glues. So, too, did panels piled in stick under an open-sided shed in Nigeria, while panels fully exposed there showed a degrade in melamine-formaldehyde, incipient deterioration in fortified urea-formaldehyde, and deterioration in normal urea-formaldehyde resins. *From authors' summary.*

4257. KÖHLER, R., and ENZENSBERGER, W. Melaminharze in der Holztechnik. **[Melamine resins in the wood industry.]** *Holz Roh- u. Werkstoff* 10 (2), 1952 (51–6). 19 refs. [G.g.] P.R.

The most important property of melamine, as compared with other synthetic resins, is a very high hardenability. Their use in the manufacture of laminated wood and waterproof plywood is described.

4258. DADSWELL, H. E., FITZGERALD, J. S., and TAMBLYN, N. **Investigations of phenolic resins for making improved wood, 1942–44. II. The influence of resin composition on the properties and structure of the improved wood.** *Aust. J. appl. Sci.* 3 (1), 1952 (71–87 + 12 photos). 2 refs. P.R.

Presents the results of various tests on compreg manufactured from *Ceratopetalum apetalum* veneers with the various phenolic resins described in Part I [*For. Abstr.* 13 (No. 1564)]. Microscopic examination has shown that particles of higher polymerized resins were deposited in the cell cavities, whereas resins of very low molecular weight appeared to be distributed in the cell walls. The penetration of the resin into the wood was assisted by (1) keeping the wet, impregnated veneers stacked for some days before drying, (2) using resins without appreciable polycondensation, and (3) using phenol rather than cresol for making the resin. This increase of resin penetration raised shear strength in the plane of the laminations but lowered the Izod impact strength. Reduction of resin content from 40 to 25% did not materially reduce the shear strength but increased the impact strength. *From authors' summary.*

4259. **Special heating methods for glue-setting: low voltage heating [for wide material].** *Rep. For. Prod. Res. Bd., Lond. 1950,* 1951 (28–9 + 1 photo).

The use of low-voltage heating (a sheet-element system relying on conduction from a surface) has in the past been limited to narrow work, owing partly to the difficulty in handling the very large currents needed for wide elements, and partly to the fact that non-uniform heating is likely to occur. Suitable equipment has now been designed for heating areas up to 3 or 4 ft. wide. The method and equipment are described with illustrations.

4260. **Special heating methods for glue-setting: radio frequency heating.** *Rep. For. Prod. Res. Bd., Lond. 1950,* 1951 (29–30).

A graphical representation, with the voltage and duration of treatment plotted against each other, of results of tests on the limiting behaviour of glues heated by the glue-line method is given, showing various zones where the glue does not set, breaks down by electrical arcing or gives weak joints for other reasons, and a central zone of safe setting conditions. The standard 5-ply Beech block test piece has been modified and improved, and the quality of the bond is now gauged by measuring the force needed for splitting open the glue line. Results of tests on synthetic resins show that urea-formaldehyde glues behave satisfactorily, but the phenolic and resorcinol types tested tend to break down by arcing.

4261. YAVORSKY, J. **FPRS Forum. What are the machining requirements for lumber being electronically edge-glued? How long a period should be used in an R.F. edge-gluing operation? What voltage should be used during an R.F. edge-gluing operation?** *Wood, Chicago* 57 (3), 1952 (44–5). P.R.

The lumber must be flat and of uniform thickness; the edges must be straight and square, and it should be surfaced just before gluing. The curing cycle should be balanced against the make-up time. The peak voltage values vary from 800–1200 volts for Cherry and Mahogany to 1500–2500 volts for Beech, Birch, and Maple.

825. *Cleaving. Adzing. Mechanical Comminution*

See also Nos. 4377–9.

4262. BELL, G. E., and MARTIN, P. E. **Portable and small stationary type chippers.** *Mimeo. For. Prod. Lab., Can.* No. *O*-163, 1952. pp. 4 + 7 photos.

Illustrations and technical description of Canadian-made disc-type and cylinder-type chippers, and of some portable chippers made in the U.S.A.

826. *Peeling. Slicing. Trimming and Edging of Thin Sheets*

See No. 4284.

827. *Bending. Moulding (other than by Cutting)*

4263. FESSEL, F. Maschinen zur spanlosen Holzformung. **[Machines for bending wood without splintering.]** *Holz Roh- u. Werkstoff* 10 (4), 1952 157–70). 21 refs. [G.g.] P.R.

An account of modern methods of wood-bending, and an illustrated description of modern German equipment for the bending of solid wood, plywood, and laminated wood.

4264. **Bent wood members.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–3, 1951. pp. 7 + 3 photos + 2 gphs. 10 refs. P.R.

An illustrated account of the bending of solid wood pieces, and of laminated, veneered and plywood curved members.

4265. **The bending of tropical timbers.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (22 + 1 photo).

Of 27 species tested, none was comparable in bending properties with Ash or Beech, but Mansonia [*M. altissima*], though variable, was reasonably good. A new process was developed in which a layer of a good bending wood such as Beech is glued to that face of the poorer bending wood which will be in compression during bending. Tests of this process have been made with Danta [*Cistanthera papaverifera*] and several types of furniture bends have been made using Utile [*Entandophragma utile*], Sitka Spruce, Dahoma [*Piptadenia africana*] and Guarea [*Guarea* sp.]. The bending properties of all species were improved by the process. With Danta the addition of a Beech layer no more than $\frac{1}{16}$ in. thick reduced the limiting radius by up to 65%; this corresponds to an increase in maximum compressive strain of 7–19%. Further work has indicated that similar results may be obtained by substituting for the Beech layer a lamina of almost any species with the grain direction at right angles to the length of the piece that it supports.

829.1. *Finishing*

See also Nos. 4284–5

4266. BROWNE, F. L. **Natural wood finishes for exteriors of houses.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1908, 1951. pp. 9. P.R.

A general account of oil, wood sealer, and varnish finishes, their application to large-pored hardwoods, and to doors and windows.

4267. ZYCHA, H. Die Bewertung pilzhemmender Eigenschaften von Grundieranstrichen. **[Evaluation of the fungicidal properties of the priming coat.]** *Holz Roh- u. Werkstoff* 10 (2), 1952 (41–3). [G.g.] P.R.

Tests are described, by means of which the wood-protective properties of the priming coat can be roughly estimated. No 'multiple security coefficient' seems to be required for the priming agent, as priming coats are themselves protected from outside by the paint layer.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 4324–6, 4353.

4268. COULON, J.-P. Les bois de mine. **[Mining timber.]** Presses Universitaires de France, Paris. 1952. pp. 128 + 8 photos. 19 refs. [F.]

Discusses: the use of timber in French mines: markets and marketing; choice of timber and its conversion; transport; and costs. An appendix by P. Bonnot gives figures for the use of mining timber in Europe, and includes information on substitute materials, new techniques and the use of timber in mines other than coal mines.

4269. **Specifications for rural electric distribution pole lines.** Power Engineering and Construction Department, Tennessee Valley Authority, Chattanooga, Tenn. [*n.d.*] pp. 174 + 111 dgms. P.R.

Includes specifications for poles and cross-arms, detail drawings of various pole structures, and detailed material specifications relating to poles, pins, and cross-arms. The miscellaneous instructions section includes instructions on tree trimming and clearances, and data to be submitted for approval of tree felling and trimming.

4270. **Poles, piling, and ties.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–6, 1951. pp. 14 + 1 gph. + 4 tbls. 28 refs. P.R.

Deals with: choice of species for poles, piles, and sleepers; volume of poles and piles; ultimate fibre stresses for wooden poles; dimension tables; preservative treatment and life of poles; bearing loads for piles, and preservative treatment of piling; preservative treatment and life of railway sleepers. The tables contain: specific gravity of the more important species used for poles; cubic contents of poles and piling; American standard dimensions for wood poles, and composite strength figures and sp. gr. values of sleeper woods. A chart for determining the probable life of railway sleepers is appended.

4271. STAMENKOVIĆ, B., and VUKOVIĆ, B. Značaj proizvodnje pragova za NR Srbiju. **[The importance of sleeper production for Serbia.]** *Šumarstvo* 4 (3), 1951 (161–71). [Serb.e.f.]

Methods of converting Beech logs (31–65 cm. diam.) into sleepers, and the yields and values of sleepers and building timber are shown in diagrams and tables. The yield of building timber averages 42%, that of sleepers plus residual timber ca. 67%. The analysis of yields for various dimensions of logs shows that (1) logs of 40 and 62 cm. diam. give a sleeper yield exceeding 60% of their round volume; (2) the total yield of sleepers, boards and skirtings is, irrespective of the log diam., always 64–68%; (3) when sleepers are hewn in the forest, the yield is ca. 55%, while the total yield from sawmilling (sleepers plus building timber) is ca. 67%.

832. *Mills, Their Functions and Products*

See also No. 3868.

832.1. Sawmills and Planing Mills

See also Nos. 4232 *et seq.*, 4271, 4314, 4363, 4377.

4272. FRANKSSON, R. Praktisk sågverkshandbok. [**A practical manual of sawmilling.**] AB Svensk Trävaru-tidning, Stockholm. 1950. pp. 522. [Sw.]

Contains sections on: timber (sorting, storing, transport, and barking); the sawmill (with details of equipment and methods); seasoning; timberyards; sawing rules; sorting regulations; planing; cutters and moulders; saw blades; transport (in the mill); machine drives; apparatus for collecting dust and shavings; power; safety measures, insurance; miscellaneous tables; and domestic and foreign systems of weights and measures. There are numerous illustrations and tables, and an index.

4273. WEBB, B. E. **Sawmill types and their performance.** *Malay. Forester* 15 (1), 1952 (19–23).

Gives tabulated data on existing sawmills in Malaya under the heads: average annual output; maximum annual output; type of power; number and kind of saws.

4274. TELFORD, C. J. **Small sawmill improvement. Practical pointers to field agencies. Mechanically powered deck equipment.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*899–28, 1951. pp. 2 + 2 photos + 4 dgms. P.R.

Illustrated descriptions of: bar kicker, hook turner, and rocker-arm turner, all home-made log-turning equipment.

4275. MEGILLE, X. DE. Une solution au problème de la manutention pour les scieries de moyenne et petite importance. [**One solution of the handling problem in medium and small sawmills.**] *Rev. Bois Appl.* 7 (4), 1952 (19–21). [F.]

An illustrated description of a new lightweight, rotatable winch with a horizontal pulley, which, working over one of two other pulleys arranged in suitable positions, facilitates the hauling of logs from the log dump to the cross-cut, and thence to the main saw. The cable consists of a multiple steel-wire core covered with hemp; only the 3-m. long end portion of the cable is bare. The same winch can be used for unloading logs from a lorry or for rolling logs to a considerable distance.

4276. VERTEBNYĬ, P. I., and GRUZDEV, V. A. Primenenie avtopogruzčikov dlja pogruzki pilomaterialov na železnodorožnye platformy. [**Application of lift trucks for loading sawn timber on railway flats.**] *Lesn. Prom.* 1950 (9), (26–8). [Russ.]

A detailed illustrated description of experiments using 3-ton, '4000'-type lift trucks. The experiments consisted in unloading the converted timber from narrow-gauge railway waggons on to a loading platform, forming lots 115 cm. wide and 60–63 cm. high, and loading.

4277. LEHELÄ, E. Sahatavaran rimoittaminen. [**Stickering lumber packages.**] *Pap. ja Puu* 34 (4*a*), 1952 (160–4). [Fi.e.] P.R.

Stacking methods and machines for handling sawn timber in bigger transport units instead of piece by piece are described, with illustrations.

4278. TELFORD, C. J. **Small sawmill improvement. Practical pointers to field agencies. Slab-disposal devices for portable mills.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*899–29, 1951. pp. 2 + 1 photo + 2 dgms. P.R.

An illustrated description of a rotating-drum slab heaver and belt-type portable slab conveyor, used by certain portable mills instead of the conventional trough conveyors.

4279. TRAĬTELJMAN, G. JA. Rotacionnyĭ zagruzitelj drevesnyh othodov. [**Rotary wood-waste 'loader'.**] *Lesn. Prom.* 1950 (7), (24–5). [Russ.]

Illustrated description of a device for transferring wood waste from the cyclone or hopper to a pipe where a pressure of over 1 atm. is maintained; the device has been developed by I. R. Čulikanov. It is claimed to have a higher efficiency and output than other types, e.g. injectors, valves, or fans. The waste is delivered from the cyclone or hopper into one of four cylindrical cavities in a slowly revolving horizontal rotor and, after half a revolution (ca. 2 sec.), it is blown downwards through an exit pipe by a current of compressed air. An output of 18 tons/hr. is claimed. The dimensions are 94 × 110 × 71 cm.; the (rotor) power required is 0·37 h.p. (Continental), and the coefficient of efficiency, 0·92.

4280. BELL, G. E. **Gang saw production higher in small log conversion.** *Canada Lumberman, Toronto* 71 (9), 1951 (86, 188). X.

A limited study was made at one mill on sawing by gangsaw (932 logs) versus circular headrig (637 logs). Results show that: (1) the gangsaw produced 5% more lumber, 4% less sawdust, 1% less trim, and the same volume of slabs and edgings; and (2) the gangsaw required on an average 20 man-minutes/M. bd. ft. more than the circular headrig. All logs entering the mill were scaled by two log rules; overrun for both rules was 9% higher for gang-sawn logs. At present prices, this extra volume would have a value of more than $5,000 per million ft. of lumber sawn, against an increase in labour costs of only $300.

4281. PRATT, W. E. **Sawing knotty cants.** *Timberman* 53 (6), 1952 (157).

Diagrams are given showing the greater yield of clear boards obtained from a knotty cant sawn into vertical-grain rather than flat-grain timber. The saving is greatest when the knots are near the centre of the cant with a knot angle of 80–100°, and is not significant when they are near the edge of the cant.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-wood Assemblies

See also Nos. 4190, 4198, 4249 *et seq.*, 4299, 4300, 4327–8, 4391.

4282. **Utilization of Sierra Juniper [*Juniperus occidentalis*].** [*Bienn.*] *Rep. Ore. St. For. 1948/49–1949/50*, [1950] (69).

There was no significant difference in specific gravity between this wood and that of *J. virginiana*. Studies of gluability, hardness, veneer slicing etc. indicated that it is suitable for the manufacture of plywood.

4283. **Trials of timbers for plywood manufacture. Progress report 12. Preliminary tests on five species.** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 27. P.R.

Results of tests on *Afzelia* sp., *Cistanthera papaverifera*, *Ocotea rodiaei*, *Parinari excelsa*, and *Cynometra alexandri*.

4284. KÜBLER, H. Neue Maschinen für die Sperrholzindustrie. **[New machines for the plywood industry.]** *Holz Roh- u. Werkstoff* 10 (4), 1952 (144–57). 6 refs. [G.g.] P.R.

An illustrated description of modern German squaring saws, peeling machines, clippers, patching machines, machines for head-joint trimming, taping machines, multiple-blade circular saws, glue-spreaders, presses, machines for final trimming, polishing machines, and scraping machines.

4285. LUTZ, J. F. **Measuring roughness of rotary-cut veneer.** *Timberman* 53 (5), 1952 (97...100).

Describes, with illustrations, apparatus for 'shadow sectioning' by which measurements of peaks in the sawtooth shadow pattern thrown up by the rough surface from a straight-line shadow are converted into values for depth of roughness. Preliminary tests made on ten $\frac{1}{8}$-in. Douglas Fir veneer samples gave depths of roughness ranging from 0·008 to 0·046 in. After the samples had been sanded to the extent indicated by the results, the surfaces of all pieces were essentially uniform and smooth. This indicates that roughness measurements are relatively accurate.

4286. **Veneer cutting and drying properties.** *Rep. U.S. For. Prod. Lab., Madison* Nos. *D*1766–4; *D*1766–5; *D*1766–6; *D*1766–7, 1951. Each pp. 4–5; 4–7 refs. P.R.

Deal respectively with Western Larch [*Larix occidentalis*], Pecan, Hickory, and Western Hemlock [*Tsuga heterophylla*].

4287. KEYLWERTH, R. Der Verlauf der Holztemperatur während der Furnier- und Schnittholztrocknung. **[Temperature variation during the seasoning of veneer and converted timber.]** *Holz Roh- u. Werkstoff* 10 (3), 1952 (87–91). 3 refs. [G.g.] P.R.

The results of wood temperature measurements are discussed. During the convection seasoning of veneer, three stages were observed: (1) a relatively short preheating stage during which water vapour condenses on the veneer surface below the dew-point temperature, (2) a stage of dynamic equilibrium, when the largest proportion of moisture is evaporated, and (3) the end stage when the veneer temperature rises steeply. In order to obtain a high-quality product, it is advisable to control the various zones of the kiln climate, to provide for a large output of the blower (fan) and for the reversal of the air current, and to have a conditioning zone adjacent to the kiln. Shorter seasoning periods can be attained by using contact drying (between warm metal plates and rollers). During the seasoning of converted timber two critical phases can be observed—the establishment of the moisture gradient indispensable for proper seasoning, and the crossing of the fibre-saturation point. The former is associated with external cracks and cup-shakes, the latter with internal cracks (in hardwoods). The end of the seasoning occurs when the surface and inner temperatures of timber are the same. Admixture of air can reduce the amount of yellowing, during high-temperature seasoning, owing to the lower cooling limit. Seasoning with hot steam does not cause undesirable changes in wood, but requires greater circulation of the gas phase or a periodic reversal of the current.

4288. ELLWOOD, E. L. **The seasoning of rotary peeled veneer from *Eucalyptus regnans* F.v.M.** *Aust. J. appl. Sci.* 3 (1), 1952 (53–70 + 6 photos). 5 refs. P.R.

It was found that the primary cause of degrade in *E. regnans* veneer is differential collapse acting between associated zones of springwood and summerwood, gross shrinkage in the former during drying being considerably greater than in the latter. The critical period occurs during the early stages of drying when an adverse combination of relatively low-tension strength and high-collapse intensity exists within the wood. It has been shown that the most satisfactory drying quality is obtained by controlling wet-bulb temperature at 95° F. to inhibit collapse, by holding dry-bulb temperature to 150° F. to accelerate the drying rate and reduce checking, by providing a high rate of air circulation to maintain max. wet-bulb depression and rapid evaporation during drying, and by reconditioning at the end of drying to eliminate wrinkling, to close checks, and to recover sheet width. With these conditions it is possible to produce veneer of high commercial quality. *From author's summary.*

4289. NARAYANAMURTI, D., and PRASAD, B. N. Infrarottrocknung von Furnieren. Vorläufige Mitteilung. **[Infra-red drying of veneers. Preliminary communication.]** *Holz Roh- u. Werkstoff* 10 (3), 1952 (92–4). 8 refs. [G.g.] P.R.

Presents the results of experiments with veneers made from 11 tropical species. The drying curves are similar to those for convection seasoning. Power consumption varied between 1·6 and 5·2 KWH/kg. moisture. The quality of the seasoned veneers was satisfactory. The energy efficiency varied from 30 to 59%, the average value for veneer 1·6 mm. thick being 40%.

4290. **Plywood commercial standard established.** *B.C. Lumberm.* 36 (2), 1952 (60).

Summarizes a grading standard established by the Plywood Manufacturers Association of British Columbia.

4291. KUENZI, E. W. **Flexure of structural sandwich construction.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1829, 1951. pp. 11. 5 refs. P.R.

4292. MOHAUPT, A. A., and HEEBINK, B. G. **Effect of defects on strength of aircraft type sandwich panels.** *Rep. U.S. For. Prod. Lab., Madison* No.

D1809-*A*, 1951. pp. 10 + 2 photos + 2 dgms. + 1 gph. + 5 tbls. P.R.

It has been found that poor bonds in sandwich constructions of aluminium facings, and of glass-cloth facings, on Balsa core, reduce the flatwise tensile strength much more than they reduce the bending and edgewise compressive strengths. Wrinkles in the glass-cloth facings reduce the compressive and tensile values proportionally to the depth of the wrinkles.

4293. NARAYANAMURTI, D., GEORGE, J., SUBRAMANYAN, N., and DAS, N. R. **Weathering trials on some synthetic resin bonded aircraft components.** *Indian For.* 78 (5), 1952 (241–51 + 20 photos, gphs.). Cf. *For. Abstr.* 13 (No. 1608).

832.4. Wooden-House Factories. Prefabricated Houses and Standardized Parts of Houses

See also No. 4295.

4294. MOROZOV, N. A. Opyt potočnogo proizvodstva stenovyh detaleĭ bruskovyh i karkasnyh domov. [**Experience in the continuous production of wall elements for board- and panel-construction houses.**] *Lesn. Prom.* 1950 (7), (20–2). [Russ.]

An illustrated description of their production for sectional board-construction houses and for sectional panel-construction houses in the Leningrad house-building factory.

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

See also No. 4369.

4295. **Timber prefabs—what are their hazards?** *Fire Prot., Lond.* 15 (139), 1952 (203). P.R.

Incidence of fires in wooden houses erected in Scotland since the war has not been unduly high. To reduce the risk, the essential requirement is to allow plenty of space between the houses and a chimney-flue height of at least 3 ft. above ridge level.

833.1. Building Components and Fittings: General

See also No. 4294.

4296. WIJNHAMER, P. T. Een vereenvoudigd gespijkerd dakspant. [**A simplified, nailed roof-truss.**] *Tectona* 41 (3/4), 1951 (1952), (189–99). [Du.e.jav.]

Describes a roof-truss of simple design making use of preservative-treated wood of low quality.

4297. **Wooden floors — sundry information.** *Technical Division Report, Office of Technical Services, U.S. Dept. of Commerce, Washington* No. *IR*-6510 [*n.d.*] pp. 4. P.R.

Residential flooring in the U.S.A. is ca. 85% hardwood—primarily Oak, of which ca. 90% is strip flooring of random length, and ca. 5% parquet floor. Hard Maple comes next after Oak, and in industrial floors it is more commonly used than Oak. Little glued parquet is being made. The general practice is to mill the tongues from the full wooden strip. Floors are usually finished with a penetrating sealer after sanding.

833.3. Special Uses in Factories and Workplaces

See also Nos. 4333–4.

4298. CAMPBELL, W. G., and PACKMAN, D. F. **The use of timber in the chemical industry.** Pp. 47–9 in *Materials of Construction in the Chemical Industry*, Society of Chemical Industry, London. 1950. 58 refs. P.R.

Discusses the use, advantages and disadvantages of timber as material for this industry. The difficulties in choosing suitable substitutes for the timber species now favoured in the United Kingdom (Pitch Pine, Southern Cypress, Kauri Pine, Baltic Redwood, Burma Teak, and White Oak) are discussed in detail for the case of vat-making.

833.5. Wood in Bridges, Culverts etc.

4299. DEGRACE, R. F. **Timber bridges.** *Pacific Road Builder and Engineering Review, San Francisco* 76 (3), 1951 (18–20, 25–6, 28). D.S.I.R.

Discusses the merits of glued laminated timbers ('glulam') used in the construction of timber bridges, and describes fabricating methods, pressure treating with preservatives, decking made of laminated wood, maintenance, and assembly.

834. *Shingles. Cooperage. Packing Containers*

See also Nos. 3847, 4187, 4298.

4300. BOTELHO, E. AZEVEDO. Ensaios de resistência de caixas de laranja de pinho brasileiro. [**Strength tests of Parana Pine orange boxes.**] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (245–7). [Port.e.]

Presents the results of strength tests made at the Instituto Nacional de Tecnologia on plywood, clamped orange boxes made from *Araucaria angustifolia*. They are about 52% lighter than ordinary wooden boxes, more resistant to dropping, but less resistant to static loading.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Uses etc.*

4301. CLARKE, L. N. **Project T.P. 12. Battery separators. Progress report No. 31. Experiment T.P. 12-9. The examination of timbers of the South-West Pacific area for use in the manufacture of battery separators. (Twelfth report.) Comparison of the electrical and mechanical properties of *Agathis microstachya* and *Agathis palmerstoni*.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organisation, Melbourne. 1951. pp. 8. 3 refs. P.R.

Certain electrical, mechanical and chemical tests were carried out on separators of (1) *A. microstachya* and (2) *A. palmerstoni* to see if there was any significant difference between them. The Mn content of untreated (1) was only about ¼ of that of (2) but its breaking radius and flexibility angle were inferior

and its handling properties very poor. It is concluded that as (1) at present constitutes only ca. 2% of the supply of North Queensland Kauri as marketed for battery separators, this species could be well omitted from the list of timbers suitable for their manufacture. *From author's summary.*

4302. NICHOLAS, N. **Violin research.** *Research, Lond.* 2 (5), 1949 (221–4). 36 refs. O.R.S.

Discusses the results of research on the effect on violin quality of various factors, including wood thickness, varnish and chemical treatment.

4303. NICHOLAS, N. **Violin research by instrument synthesis.** *Research, Lond.* 2 (5), 1949 (237–42). 5 refs. O.R.S.

Factors studied included the acoustic properties of different woods, and further research on this subject is proposed. Photographs are given showing the frequency of vibration of strips of Pine cut along and across the grain, Pine cut with the grain and varnished, Maple, Cherry and Balsa.

4304. CLINE, G. M., DOLLEY, H. O., and OSBORN, R. C. **Emergency wooden respirator.** *Journal of the American Medical Association, Chicago* 145 (7), 1951 (485). O.R.S.

Describes briefly, with an illustration, a wooden respirator which can be used in treating poliomyelitis until an iron lung can be obtained. [Cf. *For. Abstr.* 13 (p. 462).]

836. *Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments*

See also No. 4391.

4305. NUNES, G. MARQUES. Fabricação e evolução do mobiliário no Brasil. [Manufacture and evolution of furniture in Brazil.] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (194–201). [Port.e.]

838. *Vehicles (including Ships, Boats, Aircraft)*

See also Nos. 4292–3.

4306. WRIGHT, W. **Post-war timbers for vehicle bodies.** *Timber News* 60 (2155), 1952 (226–8).

Lists, and comments upon, timbers of 36 (predominantly imported) species.

4307. BROTERO, F. A., and ANDREONI, A. Aplicações do pinho brasileiro em pequenas embarcações. [The use of Parana Pine in small craft.] *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (108–12). [Port.e.]

Describes the construction of a small boat from *Araucaria angustifolia*. The wood was brush-painted with 5 coats of a mixture composed of 5 parts (by weight) of pentachlorophenol, 5 parts pitch and 100 parts alcohol. After 3½ years' use no signs of deterioration were found.

839.8. *Industrial Waste Wood and its Uses*

See also Nos. 4234, 4272, 4278–9, 4387–90, 4394.

4308. BLAKEY, G. G. **A new or improved process for the production of fuel from woodwaste.** *Brit. Patent* No. 656,832, Sept. 5, 1951. pp. 2. P.O.

Wood waste is reduced to a moderate degree of fineness, impregnated with residual oil from coal gasification with an addition of an (acid or alkaline) reagent, and compressed at ca. 250–260° C.

4309. SAGET, J.-G.-Y. **Agglomeré combustible et son procédé de fabrication.** [Fuel briquettes and method for their manufacture.] *French Patent* No. 973,148, Feb. 7, 1951. pp. 2. [F.] P.O.

The briquettes, mainly for gas-producers, consist chiefly of a mixture of wood waste (or charcoal or coal) with a binder (tar, silicates etc.), compressed and heat-treated so as to produce a coked layer on the surface.

4310. KOLESNIKOV, S. N., MELJNIKOV, S. E., ŠEŠUKOV, N. G., and KTOROV, A. V. **Briketirovanie othodov derevoobrabotki.** [Briquetting of wood waste.] *Lesn. Prom.* 1950 (12), (20–2). [Russ.]

An illustrated description of a briquetting plant, including the pneumatic transport of waste, designed by the authors. Small, and comminuted large, wood waste goes to the cyclone and thence to the hopper. The briquetting press weighs 12·5 metric tons; its total thrust is 100 tons, the specific briquetting pressure 1000 kg./sq. cm., and output per hour 3,600 briquettes measuring 16 × 6·8 × 3 cm., and weighing 350 g. each.

4311. MCCABE, L. C. **Atmospheric pollution.** *Industr. Engng. Chem.* 44 (4), 1952 (111*A*–112*A*). P.R.

Stresses the need for properly designed multiple-chamber wood-waste incinerators, as the single-chamber (silo) types now in use are not easily controlled and often produce smoke, eye irritants, ash and soot. Technical details of multiple-chamber incinerators are outlined.

4312. ELLWANGER, L. **Suspension burning of bark refuse.** *Tappi* 35 (3), 1952 (108–11). P.R.

Illustrated description of a bark-fed boiler furnace utilizing flash-drying and extreme furnace turbulence. The typical heat balance at heavy load was: loss due to dry gas, 5·9; to moisture and H in fuel, 13·7; to CO, 0·2; to unburnt combustibles, 1·0; to radiation, 0·5%; hence actual boiler efficiency (by difference), 78·7%, at 123,000 lb./hour steaming rate.

4313. DAWSON, R. C. **The use of woody materials on agricultural land: a review.** U.S. Soil Conservation Service, Washington. 1950. pp. 14. 53 refs.

4314. CARPENTER, R. D. **Amount of chippable waste at Southern Pine sawmills.** *Tappi* 35 (3), 1952 (145*A*–147*A*). P.R.

The results of a study conducted in 1948–9 at 16 sawmills in northern Louisiana and in southern and central Arkansas. On the basis of their sawing equipment, the mills were divided into 4 classes. The logs were mostly Loblolly and Shortleaf Pine, all peeled before sawing; they were practically all of second-growth timber with very little heartwood. The proportion of chippable waste ranged between 0·43 (1st-class mills) and 0·61 (3rd- and 4th-class) cords/million bd. ft. The highest proportion of waste was found in the lowest diameter group (6 in.); only for the 4th-class mills was it found in the 8-in. diam. group. The proportion of total waste that was chippable declined from 97% for 6-in. logs

to 91% for logs > 17in. The amount of total and chippable Pine waste from study logs (ca. 700 logs for each mill class) is tabulated and instructions are given for predicting, with reasonable accuracy, the production of total heavy wood waste at most mills cutting Southern Pine.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

4315. **Barrier cream versus dermatitis.** *Timber News* 60 (2153), 1952 (119).

A brief account of barrier creams for preventing contact between the skin and irritant substances encountered in operations covering seasoning and preservation, the use of glues of the phenol and urea-formaldehyde type, and finishing-off processes (lacquers, varnishes and paints). The creams are produced in two main specifications: water-repellent and water-soluble, and both can afterwards be washed off with water.

841. *Wood Preservation*

See also Nos. 4270, 4299, 4307, 4335–52, 4361.

4316. BROESE VAN GROENOU, H., RISCHEN, H. W. L., and BERGE, J. VAN DEN. **Wood preservation during the last 50 years.** A. W. Sijthoff, Leiden. 1951. pp. xii + 318 + 52 photos. 1293 refs. [E.] P.R.

Contains two main sections: wood preservatives, and scientific research, in addition to a description of wood pests and methods of preservation.

4317. INOUYE, Y., NISHIMOTO, K., and ECCHU, K. **Studies of wood preservatives. 3. On the dehydrogenating reactions with sulphur Pine root oil and its fungistatic action.** *Wood Res., Kyoto* No. 6, 1951 (7–16). 4 refs. [Jap.e.] X.

A comparative study of the preservative action of turpentine, cresol, and Pine root oil.

4318. HÄGER, B. O. **Manufacture of wood preservatives.** *U.S. Patent* No. 2,565,175, Aug. 21, 1951. pp. 4. P.O.

Reaction in an aqueous system between a hexavalent Cr compound of at least one metal of the group consisting of Ca, Sr, and Ba, a pentavalent As compound and at least one compound of the group of salts consisting of sulphates and carbonates of a metal selected from the group consisting of Zn, Cu, Al, Mg, Cd, Mn, Fe, Hg, Cr, and Ni.

4319. PICKREN, J. H. **Wood treating preparations.** *U.S. Patent* No. 2,557,062, June 19, 1951. pp. 2. P.O.

A mixture of the reaction products of a heavy-metal salt selected from the group consisting of nitrates, carbonates, and hydroxides of Cu and Zn, with CrO_3, phenolsulphonic acid, and water.

4320. WARD BLENKINSOP & COMPANY LTD., LONDON. **[Timber] preserving composition.** *U.S. Patent* No. 2,564,276, Aug. 14, 1951. pp. 3. P.O.

An aqueous solution of a phenyl Hg salt of an acid $RR^1CR^2R^3$ where R and R^1 are residues of naphthalenesulphonic and naphtholsulphonic acids, while R^2 and R^3 are alkyl or aryl groups.

4321. KNEALE, R. E., and TAMBLYN, N. **Project P. 9: Properties of wood preservatives. Sub-project P. 9–4: Tests of metallic naphthenates prepared from different naphthenic acids for use as wood preservatives. Progress report No. 3. The toxicity of naphthenic acid and copper naphthenate to wood destroying fungi.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 16 + 7 gphs. P.R.

The toxicity of several types of naphthenic acids was found to vary widely, increasing as the acid number of the crude acid increased. The toxicity of Cu naphthenate also was related to the acid number, but while samples with high acid number were just as toxic as the corresponding crude acids, those with lower acid numbers were more toxic than the corresponding acids.

4322. **Tests show practicality of solvent recovery.** *Wood, Chicago* 57 (3), 1952 (32, 38, 49, 56, 76). 6 refs. P.R.

Describes laboratory tests showing that it is possible to recover ca. 95% of volatile solvents used with oil-soluble preservatives, as well as some preservative, thus making for economy and improving the painting properties of the wood. The method used was the modified vapour-drying process; the preservative tested was Cu naphthenate, and the six solvents were: VM & P naphtha, Stoddard solvent, trichloroethylene, perchloroethylene, toluene, and xylene. Vapour-drying was also found to improve the effect of a water repellent added to Cu naphthenate.

4323. SCHULZE, B. Gesteigerter Holzschutz durch Beachtung des Eindringens der Schutzmittel. **[Improved wood preservation by attention to the penetration of the preservatives.]** *Bauplanung und Bautechnik, Berlin* 2 (12), 1948 (353–8). [G.] P.R.

Reviews investigations on the penetration of preservatives conducted at the Materialprüfungsamt, Berlin-Dahlem, since 1938. In non-pressure impregnation, the liquids introduced through rays are distributed in the lumina of summer-wood tracheids. The cell wall does not absorb oils, but does absorb aqueous solutions. Spring wood remains unpenetrated by either. For oily preservatives, the wood must contain less than 28% moisture. Penetration of aqueous solutions increases with the moisture content of the wood; dry wood is more deeply penetrated by weak solutions, moist wood more deeply by strong solutions; best penetration and distribution occurs at fibre-saturation point. Wetting agents often hinder penetration. Oils are not suitable for softwoods. Heartwood is impenetrable to all kinds of preservatives. A case of complete impregnation of dry timber infested with *Callidium bajulum* larvae is discussed.

4324. DOOLITTLE, F. B. **Shallow incisions give durable crossarm treatment.** *Electrical World, Albany, N.Y.* 134 (23), 1950 (120). L.S.

A nearly uniform penetration of preservative was achieved by the Southern California Edison Co., Los Angeles, for all surfaces of non-pressure-treated cross-arms, when closely spaced, ⅛-in. incisions were used in combination with various non-pressure treating cycles involving hot and cold immersion in preservative. The treating cycle consisted of a 2-hour immersion in preservative at 230° F., a quick change to cold preservative for another 2 hours, and a final ½-hour hot bath. An average retention has been reported of ca. 6 lb. of preservative per cu. ft. of wood in 10-ft. cross-arms having 7 bolt holes and 10 holes for 1½-in. wood pins.

4325. **Creosoted jetty on German coast has good service record.** *Wood Pres. News* 30 (2), 1952 (15–7, 22). P.R.

A report on the inspection of creosoted piles after 17–23 years' service in the jetty on the Schweinsrücken opposite Wilhelmshafen, Germany. The inspection, carried out in October, 1948, disclosed that both the Pine (4·2–13·1 lb. creosote/cu.ft.) and Beech (11·8 lb. creosote/cu.ft.) piles, creosoted and driven between 1925 and 1931, showed no erosion by teredo or other marine borer. Out of 2,354 Pine piles, and 6,000 Beech piles, only 5 had cores destroyed by teredo, probably owing to mechanical damage or splitting during driving. Untreated controls were completely destroyed.

4326. GRIFFIOEN, K. **An experiment with impregnated sleepers in an Indonesian railroad track.** *Commun. For. Res. Inst., Bogor* No. 34, 1952. pp. 22. 3 refs. [E.jav.du.] (*Repr.* from *Tectona* 41, 1951 (157–78).)

Report on a track test laid down in 1929 and continued for 12 years. The species tested included *Dipterocarpus trinervis*, *Schima noronhae* and *Palaquium* sp. Impregnation with mixtures of creosote and creosote residue (whereby it is possible to reduce the amount of creosote to 15%) increased the life of sleepers to 6 times that of untreated controls, a result comparable to that obtained by the much more expensive treatment with pure creosote.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

See also No. 4258.

4327. **Modified woods and paper-base laminates.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–2, 1951. pp. 13 + 2 tbls. 37 refs. P.R.

A general account of impreg, compreg, staypak, and papreg and other paper-base laminates. Properties of modified woods are compared with each other, and strength properties of normal and modified Yellow Birch laminates are tabulated.

843. *Fireproofing and Fire Resistance*

4328. GILLES, F. Ignifugation des placages. Impregnation par immersion. **[Fireproofing of plywood. Impregnation by dipping.]** *Étude tech. Inst. nat. Bois* No. 8, 1951. pp. 1 + 17 + 3 + 28 gphs. [F.e.] P.R.

Presents results of tests on the optimum conditions for applying $NH_4H_2PO_4$ as a fire retardant to the individual veneers before gluing. Much better results were obtained with 're-humidified' veneers (moisture content ca. 80%) than with air-dry ones. The absorption rate of the salt depends to a large extent on the thickness and wood species; on the whole, all commercial woods available in France are relatively easily fireproofed in veneer form (only Gaboon requires a longer soaking or a higher temperature). The tests were conducted mostly with Beech veneers, at temperatures ranging from 20 to 90° C., using solution concentrations of 10 to 25%. The last series of experiments used saturated solutions of $NH_4H_2PO_4$ on Beech, Birch, Okoumé, and Poplar. Impregnation rates were higher than with weaker solutions but not as high as could be expected.

4329. BRONIATOWSKI, A. Quantitative Bestimmung des Gehaltes von P_2O_5 aus imprägnierten Holzfasern. **[Quantitative methods for determining P_2O_5 in wood fibres impregnated [with solutions of phosphates].]** *Svensk PappTidn.* 55 (9), 1952 (313–5). 5 refs. [G.e.sw.] P.R.

Two methods are described for determining the P_2O_5 content of fire-proofed wood or fibreboard.

844. *Attack by Plant Organisms*

844.1. Sap-staining Fungi

See Nos. 4335–40.

844.2. Wood-destroying Fungi

See also Nos. 3975–80, 4337–41, 4408.

4330. **Mycological technique.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (41).

A method of conserving cultures by covering them on an agar slope to a depth of 1 cm. with sterilized heavy mineral oil is being tried [cf. *For. Abstr.* 13 (No. 3421)]. Further studies on the use of soil as a medium have been made. Vermiculite has been found to be less good as a medium than agar or soil.

4331. BIRKINSHAW, J. H., MORGAN, E. N., and FINDLAY, W. P. K. **Biochemistry of the wood-rotting fungi. 7. Metabolic products of *Polyporus benzoinus* (Wahl.) Fr.** *Biochem. J.* 50 (4), 1952 (509–17). 23 refs. O.R.S.

With an appendix by *S. Marcus*: Antibacterial activity of the triterpinoid acid (polyporenic acid C) and of ungulinic acid, metabolic products of *P. benzoinus*. [Cf. *For. Abstr.* 13 (No. 748).]

4332. **Laboratory tests on resistance of timbers to decay.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (40–1).

Tests were made on: *Albizzia* sp., *Antiaris africana*, *Berlinia* sp., *Piptadenia africana*, *Mimusops heckelii*, *Brachystegia* sp., *Erythrophleum guineense*, *Ricinodendron rautanenii*, *Cynometra alexandri*, *Tarrietia utilis*, *Daniella ogea*, *Pterygota* sp. and *Sterculia oblonga*. Of these *Albizzia*, *M. heckelii* and *E. guineense* were the most resistant to decay.

4333. **Deterioration of timber in water-cooling towers.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (39–40).

Examples of decay similar to that in the louvres of cooling towers have been found in Scots Pine in a sub-floor joist of a house subject to flooding and in a pressure-creosoted pile from the River Nene, in Bog Yew from Norfolk, in structural timber of English Oak, in buried planks and creosoted plywood of Beech, and in imported Krabak [*Anisoptera* spp.]. In all of these, microscopic breakdown showed perforation of the secondary cell walls, particularly in the summer wood, by hyphae running longitudinally within the thickness of the cell walls. [Cf. *For. Abstr.* 13 (No. 2516).]

4334. AARON, J. R. **Problems in the selection of timber for water cooling towers.** *Quart. Rev. Timb. Developm. Ass.* 3 (5), 1952 (9).

Discusses damage by *Chaetomium globosum*; the abnormal alkalinity of water treated with a softening agent; the abrasive action of falling water containing siliceous particles; and the destructive pressure exerted by sulphates present in the form of permanent hardness in the water if the towers are allowed to dry and the sulphates to crystallize out. Outlines proposed research by the Timber Development Association, the British Electricity Authority, and the Forest Products Research Laboratory, to be carried out at the British Electricity power station at Connah's Quay, Flintshire.

844.4. Control and Prevention

See also No. 4267.

4335. SCHULZ, G. Ein mykologisches Verfahren zur Bewertung vorbeugender Schutzmittel gegen das Verblauen von Kiefernholz. [A mycological method of assessing preservatives against blue-stain of Pine wood.] *Repr.* from *Angew. Bot.* 26 (1), 1951 (42–54). 7 refs. [G.g.] [Institut für angewandte Mykologie und Holzschutz (Biologische Bundesanstalt), Hann. Münden.]

In a new test method, samples (kiln-dried at 105° C., for use within 6 months) are pressure-treated with a solution of 1% malt extract for 5 min., left for 20 min. in the solution, drained, sterilized in steam, soaked for 1 min. in the preservative solution, drained again and inoculated with blue-stain fungi. Preliminary tests on preservative-treated and non-preservative-treated samples with and without added nutrient showed an equal degree of bluing on green wood and kiln-dried wood with added nutrient, very much less bluing for kiln-dried wood soaked in water with no nutrient addition, and no bluing for samples air-dried for 12–18 months with added nutrient. Tests were made using a number of different preservatives with five test fungi, and 'mycocidal threshold values' were established; these are useful as showing the comparative effect for different preservatives, but do not necessarily indicate the concentrations for use in practice. *Scopularia phycomyces*, *Pullularia pullulans*, and *Ophiostoma pini* were the most resistant to the preservatives tested.

4336. BACON, L. R., and CONKLIN, D. B. **Inorganic composition for inhibiting sap stain.** *U.S. Patent* No. 2,517,958, Aug. 8, 1950. pp. 2. P.O.

A mixture of $MgSiF_6$ and an Na borate having an $Na_2O:B_2O_3$ mol ratio of 1 to 1–2. Green wood to be dipped or immersed in a solution containing 5–25 lb. of mixture per 1,000 gals of water.

4337. **Improved mixtures of fungicides for use on lumber.** *Rep. U.S. Bur. Pl. Ind. 1949*[50], 1950 (84).

Mixtures of ethyl mercuric phosphate and Na pentachlorophenate, with or without borax, have proved highly fungistatic against moulds as well as stain and decay fungi, when used to protect green lumber in transit or during air seasoning. In such mixtures they can be so diluted with water that skin irritation is greatly decreased. Particularly effective were mixtures of the mercurial with the phenate, each at $\frac{3}{8}$–$\frac{1}{2}$ usual strength, and mixtures of the mercurial, phenate and borax each at $\frac{3}{16}$–$\frac{1}{4}$ usual strength. The use of these mixtures, especially under severe seasoning conditions, appears to be much better than the use of increased concentrations of single fungicides.

4338. WRIGHT, E. **Sapstain and decay control tests.** *Timberman* 53 (6), 1952 (140–2).

Dipping tests using borax, soda and compounds containing ethyl mercuric phosphate, sodium pentachlorophenate and sodium tetrachlorophenate were made over a period of 6 years on short pieces of Douglas Fir, Sitka Spruce, Western Hemlock, Noble Fir, and Ponderosa and Sugar Pine. The test pieces were bulk piled in conditions suitable for the development of sapstain and decay and were examined periodically. All the chemicals used singly or 2 and 3 together, gave reasonably satisfactory control of sapstain for up to 3 months. Tetrachlorophenate seemed rather better than pentachlorophenate for the Pines. Nearly all the chemicals used controlled decay for up to 9 months; the outstanding exception was a mixture containing 0·85 lb. pentachlorophenate, 2·4 lb. borax, 1·4 lb. soda to 50 gal. water. A mixture containing ethyl mercuric phosphate, pentachlorophenate, and borax in the proportions 0·25 to 1·00 to 6·00 lb. in 50 gal. water, gave very good results. There appeared to be no significant difference in rate of sapwood decay between the different species.

4339. **Mold occurrence and effects on wood.** *Rep. Sth. For. Exp. Sta. 1951* [1952] (75–6).

Fresh Southern Pine wood given a surface treatment with fluoride solutions develops a luxuriant growth of green mould (*Trichoderma*) and such wood (1) remains surprisingly free from decay and sapstain during seasoning and (2) becomes increasingly permeable to oil and water solutions. Of six hardwoods and Cedar [*Chamaecyparis thyoides*?] only *Liquidambar styraciflua* responded to the treatment similarly to southern Pine, but to a smaller degree. Laboratory tests have shown that: (1) fluorine solutions are less toxic to *Trichoderma* mould than to most sapstain and decay fungi; therefore, elimination of competition is probably the chief reason for luxuriant mould growth; (2) growth of the mould is concentrated in the wood ray and other parenchyma cells, often leading to their complete breakdown and explaining to a large extent the increased permeability

of the wood; and (3) although *Trichoderma* has antibiotic effects on fungi, other factors may be as important in explaining the absence of decay and sapstain on the fluoride-treated mould-covered wood. [Cf. *For. Abstr.* 11 (No. 3077).]

4340. RIETZ, R. C. **Salvaging lumber in the flooded areas.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1904, 1951. pp. 4 + 4 photos. P.R.

General information on the treatment of lumber in stickered or bulk piles, after submersion, for preventing stain, mould, and decay; also instructions for air-drying and kiln-drying such lumber.

4341. MACK, G. W., and SAVORY, J. G. **A new treatment for walls infected with dry rot.** Department of Scientific and Industrial Research, London. 1952. pp. 6 + 2 photos. 6 refs.

Present methods of dealing with outbreaks of dry rot are briefly discussed. Experiments with fungicidal paints and plasters as 'barrier layers' are described. Paints and plasters based on zinc oxychloride (mixture of $ZnCl_2$ and ZnO) are sufficiently promising to warrant full-scale trials, and recommendations are made for the preparation of the materials and their practical application. *Authors' summary.*

845. *Attack by Animals*

845.1. Marine Borers

See also No. 4325.

4342. BRYAN. J. **Deterioration of structures of timber, metal, and concrete exposed to the action of sea-water. 19th report: being a general summary of the experimental work carried out to date on timber.** Institution of Civil Engineers, London. 2nd ed., 1951. pp. 54.

When the 1st edition [cf. *For. Abstr.* 10 (No. 1136)] was published, tests were still in progress at Singapore and only interim reports were included. The tests have now been completed and the results are included in this edition.

845.2. Terrestrial Borers

See also No. 4323.

4343. **The common furniture beetle (*Anobium punctatum*): laboratory investigations.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (52–3).

A satisfactory egg-laying surface has now been evolved using muslin attached mechanically to samples to be infested. Artificial blocks prepared from Oak sapwood flour with blood, bone, casein or hide glues, and exposed in 1947 to *A. punctatum*, gave emergence during 1950 from blocks containing the first two but not the last two adhesives. It has been confirmed that the weight and rate of development of larvae boring in decayed wood are markedly greater than in sound controls. A study of the N content of pupae has been started and it is intended to extend this to include the analysis of beetles and larvae to obtain information on the N requirement in different stages of development.

4344. **Ultrasonics and the sterilization of insect-infested wood.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (54–5).

A 15 kilocycles/sec. generator feeding a laminated nickel transducer of surface area 6 × 2 in. with ca. 350 watts of ultrasonic power was used. Squares, 2 × 2 in., of $\frac{5}{16}$-in. Birch plywood infested by *Anobium punctatum* were exposed for 2–4 min. with dry interface or water film at interface between sample and transducer. Some of the treated samples were cut up for detailed examination and others were retained for observing insect emergence. No immediate effect on the insects was apparent and it is doubtful whether the results justify further trials.

4345. **Investigations on *Lyctus* powder post beetles.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (48–9).

Examination of sawn Oak logs sprayed with DDT in 1948 showed that spraying all sapwood in early spring with a 2% DDT preparation gave protection for at least the rest of the year, a 1% concentration gave good results but not complete protection, while at an 0·5% concentration, infestation occurred but was less than that in untreated controls. Results of treating 1½-in. Oak boards with 5% DDT or 1% γBHC preparations showed that neither applied as a fog was as effective as a spray of the same insecticide at a lower concentration.

4346. **Investigations with DDT smokes in buildings.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (54).

In an experiment at Princes Risborough a DDT smoke was liberated in a room of ca. 2,000 cu. ft. capacity containing samples of wood attacked by *Lyctus* or *Anobium punctatum*, distributed and arranged in several positions, to determine differences in the amount of deposit on the various surfaces. The deposit was estimated to be of the order of 74 mg./sq.ft.; it did not prevent the emergence of either species from infected wood, nor did it affect length of life or egg-laying if the insects were removed immediately from contact with the treated surfaces. The length of life of both species was considerably reduced, as compared with controls, by continuous contact with treated surfaces, the effect being greatest on upper horizontal surfaces and lower on vertical and lower horizontal surfaces. Conclusions so far are that such a residual deposit of DDT is insufficient to give protection against *Lyctus* or *A. punctatum* even within 2–7 days of treatment, except perhaps on upper horizontal surfaces. The value of the smoke for killing beetles emerging before or during treatment has not been determined but is likely to be considerable. [Cf. *For. Abstr.* 12 (No. 2386).]

4347. MCMULLEN, M. J. **The sterilization of Baltic Pine [*Picea abies*] infested by Siricid wood wasp.** *Aust. Timb. J.* 17 (12), 1952 (875 . . . 888, 919). 10 refs.

Experiments have been made by the Division of Wood Technology of the Forestry Commission, N.S.W., on the use of methyl bromide for fumigating infested timber. Lyctid beetles were mainly used during the experiments because not enough siricid woodwasps were available. (1) Small-scale laboratory experiments showed that MeBr concentrations of 2–3 lb./1000 cu. ft. would kill beetles artificially

sealed into 2-in. wood blocks of 'Baltic Pine', in 20 hr. Residual bromide contents in the timber were considered too small for any release of gas to be harmful, and it is unlikely that gas would be released during working unless the wood were heated. (2) In a large-scale experiment, 8,000 super ft. of 1-in. and 2-in. 'Baltic Pine' was stacked in a commercial fumigating chamber and fumigated with MeBr at 4·7 lb./1000 cu. ft. for 24 hr. Beetles sealed in boards distributed throughout the stack were killed. Similar large-scale tests using 2 lb./1000 cu. ft. in a pressure cylinder for 24 hr. gave a 90·4% kill of *Lyctus* and *Tristaria*. (3) Fumigation of stacked timber sections of prefabricated houses of 'Baltic Pine' covered with tarpaulins in the open were unsuccessful because the fabric was not sufficiently flexible to ensure an air-tight seal at ground level. Recommendations are made for fumigating stacked timber under a cover of polyvinyl-chloride sheeting. (4) Prefabricated beehive sections of *Schizomeria ovata* attacked by *Lyctus brunneus* were fumigated for 24 hr. in a sealed room of 640 cu. ft. using 3 lb. of MeBr (a concentration of 4·7 lb./1000 cu. ft.). Blocks of 'Baltic Pine', *Eucalyptus corymbosa*, *Siphonodon australe* and *Villaresia moorei* containing lyctid beetles, also placed in the room, showed a 100% kill.

The results of all these experiments suggest that MeBr would be suitable for fumigating cargoes infested with siricid woodwasps while still in the hold, without undue delay in unloading. The estimated cost, covering cost of the gas and labour, is 4*d.* /1000 super ft. for a fully-loaded and 8*d.* for a half-loaded ship.

4348. ***Sirex* committee inquiry.** *Aust. Timb. J.* 17 (11), 1951 (787 . . . 822, 774 . . . 778).

Contains part of the evidence given to the committee by L. T. Bilbe, W. D. Muir, F. M. Hewitt, F. F. Kraegen, and C. E. Lane-Poole, on existing quarantine regulations, the threat to *Pinus radiata* stands in New South Wales, the history of quarantine regulations, the efficacy of the regulations and their effect on the timber trade. [Cf. *For. Abstr.* 13 (No. 4057).]

4349. YOUL, J. W. **Evidence presented to the *Sirex* Wasp Committee of Inquiry.** *Aust. Timb. J.* 17 (12), 1952 (899, 901, 846 . . . 854).

Calls for the kiln seasoning of all susceptible softwood before shipment to Australia.

4350. JOHNSTON, H. R. **Insect control: practical methods for the control of insects attacking green logs and lumber.** *Sth. Lumberm.* 184 (2307), 1952 (37–9). 7 refs.

Summarizes the results of an investigation between 1944 and 1951 on the use of BHC to prevent attack by ambrosia beetle, barkbeetles and wood borers on green hardwood logs and timber and Pine logs.

4351. BLAIS, J. R. **Borer control in Jack Pine and Spruce logs.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (1), 1952 (2).

Logs were sprayed with DDT in experiments on the prevention of borer damage in skidways. Six skidways were used, of which two were controls, two were sprayed with an oil solution of DDT (5 lb. DDT, 1·6 gal. 'Velsicol AR–50–G', 10·8 gal. kerosene), and two with 50% wettable DDT (8 lb. powder to 10 gal. water). The sprays were applied in June before *Monochamus* adults had emerged at rates equivalent to 1·2—3 gal./1000 bd. ft. Examination of treated skidways and controls at mid-September showed that application of DDT in oil had effected an 82% reduction in borer populations, and wettable DDT 88%, compared with controls. The apparent effectiveness of the wettable DDT in spite of heavy rain more or less throughout the test, is of particular interest.

845.3. Termites

4352. SHELFORD, V. E. **Termite treatment with aqueous solution of chlordane.** *J. econ. Ent.* 45 (1), 1952 (127). 2 refs.

Tests of residual soil toxicity were made three years after treatment with chlordane [cf. *For. Abstr.* 12 (No. 578)]. At the end of 10 days all termites in contact with soil samples had died.

847. *Drying* (*Seasoning*)

See also Nos. 4179, 4189, 4192, 4195, 4272, 4286–9, 4322, 4340, 4405.

4353. **Air seasoning study of Lodgepole Pine telephone and power poles.** *Rep. Nth. Rocky Mt. For. Range Exp. Sta. 1951*, [1952] (26–7).

Preliminary conclusions are that in the western Montana area, poles piled in June will season in three months or less, and those piled in early or mid-autumn in nine months. Properly seasoned poles could be treated with preservatives in 8–12 hr.; unseasoned poles needed 25–40 hr.

4354. ESPENAS, L. D. **The seasoning of Oregon hardwoods.** *Inform. Circ. Ore. For. Prod. Lab.* No. 6, 1951. pp. 35. 9 refs.

Kiln schedules for green stock are given for: Red Alder, Cottonwood, Oregon Ash, Oregon Maple, Myrtle (California Laurel), and Madrone. Kiln schedules for air-dried stock are given or suggested for Tan Oak, Chinquapin, California Black Oak, and Oregon White Oak.

4355. SPITKOVSKIĬ, Z. M. Skorostnye metody suški tonkomernyh bukovyh detaleĭ. [**Rapid seasoning methods for small-section Beech timber.**] *Lesn. Prom.* 1950 (12), (22–3). [Russ.]

Contains tabulated seasoning schedules for Beech 25 and 40 mm. thick, at temperatures from 75 to 90° C., developed in a Kiev factory. It is claimed that, without impairing the quality, the seasoning time was reduced by 25–30% compared with the general CNIIMOD M–4 schedules for hardwoods.

4356. KEYLWERTH, R. Hochtemperatur-Trockenanlagen. [**High-temperature seasoning plant.**] *Holz Roh- u. Werkstoff* 10 (4), 1952 (134–8). [G.g.] P.R.

An illustrated description of several German kilns for high-temperature seasoning, preceded by a discussion of the two basic methods (seasoning in a mixture of hot steam with air, and in hot steam only), their merits and drawbacks.

4357. SMITH, H. H. **Direct heat lumber dry kilns.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 4, 1951. pp. 5.

Describes briefly the design of kilns where oil, petrol or wood are used instead of steam for heating, and discusses their advantages and disadvantages.

4358. OGURA, T., and ONUMA, K. **Studies on timber drying equipment. 2. On the ventilating shaft in naturally ventilated kilns.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 46, 1950 (1–16). 8 refs. [Jap.e.]

Experiments conducted in a small, specially constructed kiln have yielded data on the optimum height of the vent, vent size, and height of the ventilating shaft. [Cf. *For. Abstr.* 13 (No. 766).]

4359. PRATT, G. H., and DEAN, A. R. **Report on an investigation into the drying of timber by the application of radio frequency heating.** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 36 + 8 photos, 4 dgms., 8 graphs. 14 refs.

Summarizes the results of experiments in drying different species by the boiling method, and Oak and Beech by the temperature-gradient method [cf. *For. Abstr.* 12 (No. 3229)] from the green condition.

4360. **Radio frequency drying.** *Rep. For. Prod. Res. Bd., Lond. 1950*, 1951 (20).

Beech squares, 8 × 8 in. in cross-section, were dried from green state without checking or honeycombing in less than 2 hr. The abnormally high shrinkage which occurred could be reduced somewhat by final steaming or reconditioning. The possibilities of drying thick baulks of aircraft Spruce were investigated, but this species proved very difficult to dry by the boiling method [cf. *For. Abstr.* 12 (No. 3229)] without bursting. Semi-dried and some green material was seasoned satisfactorily by this method using very low power, but this took up to 14 hr., the strength properties were probably reduced, and bursting was not always avoided. Samples of a number of exotic timbers have been tested but with a few exceptions they either burst or charred as a result of the treatment.

4361. NETUŠIL, A. V., and GOLJDBLATT, B. Á. Vysokočastotnaja suška i propitka drevesiny. [High-frequency drying and impregnation of timber.] *Èlektričestvo, Moskva* 1948 (4), (12–7). 18 refs. [Russ.russ.] X.

Discusses the advisability of timber seasoning with R.F. currents. According to one of the papers quoted, over 3 KWH was required to remove 1 kg. of moisture from timber when a frequency of 5–60 megacycles/sec. was used, but only 1·5 KWH/kg. with a frequency of 250–500 kilocycles/sec. There are several dozen medium-wave R.F. seasoning plants operating in Russia, which handle timber up to 11 m. long and 0·3 m. square. Empirical relationships and formulae are presented for calculating the losses of electrical energy in seasoned timber, taking the anisotropy of wood structure into consideration. A 50-KW R.F. generator for timber seasoning is described. Two types of metal-gauze electrodes are used: horizontal and vertical. Irregular seasoning due to non-uniform heating is avoided by an intermittent seasoning schedule in which heating to ca. 100° C. is followed by slow cooling, then subsequent heatings and coolings. The impregnation of timber so seasoned is effected by simply dipping the hot timber into the preservative; the vacuum formed in the interior of the timber by the condensation of water vapour draws the preservative into the pores.

848. *Timberyard Practice. Handling and Storage of Timber*

See also Nos. 4144, 4272, 4275–8, 4340, 4377.

4362. ŠIBALOV, V. I., and MILOV, S. G. Mehanizirovannaja raskatka breven na lesozavodah. [**Mechanized log rolling at timber storage depots.**] *Lesn. Prom.* 1950 (5), (20–2). [Russ.]

Illustrated description of a new method of rolling (evening out) logs in the stack by using multiple log-bundles and a special shaping frame with a pulley-cable system. The method was tested in 1949 in a forest enterprise near Archangel and it was found that when the bundle volume is ca. 12–15 cu.m. the labour efficiency is twice that with manual rolling. At the same time the bundle principle increases the capacity of stacks and enables the winter dispersal of stacks to be mechanized.

4363. GUNNASON, J. **Western lumber company speeds deliveries by developing unique loading device.** *Wood-Worker, Indianap.* 71 (2), 1952 (40–2). P.R.

An illustrated description of an attachment for unloading lumber from a roller-bed lorry, developed by P. Penberthy (Penberthy Lumber Company, Los Angeles, Calif.). This attachment comprises a hinged bracket, an unloading roller, and a hydraulic installation for operating the device. It is said to deliver lumber loads with less wear and tear on lorry equipment, less operator fatigue and practically no manual handling.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 3699, 3803–4, 3945, 4241, 4281, 4285, 4292.

4364. RAULT, J. P., and MARSH, E. K. **The incidence and sylvicultural implications of spiral grain in *Pinus longifolia* Roxb. in South Africa and its effect on converted timber.** Forest Products Institute, Pretoria. 1952. pp. 21. 6 refs. [Commonwealth Forestry Conference, Canada, 1952.]

The recognition of spiral grain, variations in spirality at various levels in the tree, and the utilization of spiral-grained timber are considered. It is pointed out that the most significant factor in limiting the utilization of spiral-grained timber is the amount which a board twists in drying. This was found to be governed by the diameter of the log and the degree of angular spirality in it. The maximum amount of twist in seasoning permissible in boards used for box shooks is considered to be 12° per 10 ft. length, and in those used for structural timber 10° per 10 ft. length. The angular spirality at various diameters at which these maxima are reached is determined by graphical means and presented in tabular form.

The incidence of spirality in stands of *P. longifolia* in S. Africa was determined from observations taken in 300 sample plots, and is presented in tabular form. The data give evidence that genetic factors, age, site quality and rate of growth have effect on spirality but that effects of soil type, climate, and aspect are not significant. Stems of 22 trees were analysed and the relation between the mean length of a completed turn of a spiral, its mid-diameter and angular spirality is examined and leads to the conclusion that, in trees of given age and inherent potential spirality, angular spirality is directly proportional to mean annual increment in d.b.h. Trees of low potential spirality increase slowly in angular spirality up to the age of 10 years, more rapidly between 10 and 20 years, and reach a maximum at 30 years, which is maintained until the age of 60 years when a gradual decrease begins to take effect. Trees of medium potential spirality increase in angular spirality slightly more rapidly than those of the previous type up to the age of 10 years, decidedly more rapidly between 10 and 20 years, at which stage they reach a higher maximum which is maintained until 50 years, whereafter there is a gradual decrease. Trees of high potential spirality increase very rapidly in angular spirality to a still higher maximum, which is reached at 10 years, maintained up to 30 years, and thereafter falls off more rapidly than in the previous types. In trees of normal growth pattern, in which mean annual increment in d.b.h. accelerates up to the age of 20 years and falls off thereafter, both increase and decrease in angular spirality are accelerated and the turning point occurs at earlier ages.

It is concluded that spirality may be controlled either by restriction of diameter increment or by establishing sources from which seed of low potential spirality may be collected. The second alternative is preferred and a means of establishing such sources is suggested. *From authors' summary.*

4365. RODRIGUES, A. Estudo biométrico sobre o enrolamento dos troncos no *Eucalyptus globulus* Labill. [**Biometrical study of spiral grain in stems of *E. globulus*.**] *Agron. lusit.* 13 (4), 1951 (319–31 + 1 plate). 8 refs. [Port.e.]

Results of measurements made in stems of various lengths are presented. The study is preliminary to an investigation of the influence of spiral grain on the properties of the wood.

4366. HYLER, J. E. **Aspects of splitting.** *Sth. Lumberm.* 184 (2305), 1952 (60–1).

Discusses the anatomical causes of proneness to splitting in certain species, tension splitting in drying, fast drying as a cause of splitting, the use of glued-in splines where splitting is likely, screw and nail splits, and the use of rivets at weak points in manufactured goods.

4367. REID, J. S., and MITCHELL, M. T. **Internal checks occurring in Douglas Fir from two sites.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (2), 1951 (2–10).

Internal radial checks in heartwood and sapwood of freshly felled material are associated with low-density timber, of a low latewood %. Wind, unseasonable frosts, low temperatures and drought are possible contributory factors. [Cf. *For. Abstr.* 13 (No. 3945).]

853. *Grading of Logs*

See also No. 4369.

4368. OSTRANDER, M. D. **A handy aid for hardwood log graders.** *Ntheast. Res. Notes Ntheast. For. Exp. Sta.* No. 13, 1952. pp. 3 + 4 dgms.

Describes, with illustrated examples, a visual outline of the U.S. Forest Products Laboratory's log-grading system, which can be put on a scaling stick in combination with any conventional log rule.

854. *Grading of Converted Timber*

See also Nos. 4270, 4272, 4290.

4369. **Structural softwood. Measurement of characteristics affecting strength.** *Brit. Stand.* No. 1860, 1952. pp. 14 + 4 photos. Price 2*s.* 6*d.* P.R.

4370. TURNBULL, R. F. **Grading of hardwoods. 4. Australia.** *Emp. For. Rev.* 31 (1), 1952 (26–34). 6 refs.

Cf. *For. Abstr.* 13 (No. 2586).

86. PULP INDUSTRIES. CHEMICAL UTILIZATION OF WOOD

861. *Paper and Cardboard Industry (Pulp, Paper, Cardboard, Fibreboards)*

See also Nos. 4137, 4142–3.

Pulping and Pulp

See also Nos. 4213–4.

4371. **Fibres for paper-making.** *Nature, Lond.* 169 (4306), 1952 (772–4).

Summarizes papers read at a symposium held in London 27–28 March 1952. Among questions discussed were methods of pulping straw and hardwoods.

4372. BHAT, R. V., and VIRMANI, K. C. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part VII. Writing and printing papers from *Phragmites karka*, Trin.** *Indian For.* 78 (3), 1952 (127–37 + 2 sample sheets). 2 refs.

Actual samples of paper made from *P. karka* and from a mixture of it with *Arundo donax* are given. Pulps from *P. karka* are short-fibred and must be mixed with long-fibred pulps for commercial manufacture. [Cf. *For. Abstr.* 13 (Nos. 3457–8).]

4373. BHAT, R. V., GUHA, S. R. D., and PANDA, S. P. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part VIII. Writing and printing papers from *Boswellia serrata*, Roxb. (*Salai*).** *Indian For.* 78 (4), 1952 (169–75 + 2 specimen sheets). 3 refs.

Bleached chemical pulps suitable for the production of writing and printing papers can be prepared from *B. serrata* by the sulphate process using either stem or branch wood or a mixture of the two. Since the pulps are short-fibred, the furnish should contain 25–40% of Bamboo or other long-fibred pulp.

4374. COOMBER, H. E. **Colonial tropical hardwoods as papermaking materials.** *Tappi* 35 (4), 1952 (161–6). 9 refs. P.R.

An account of the research work done since 1924 by the Colonial Products Advisory Bureau (previously Imperial Institute), London, on the suitability of tropical woods for the manufacture of cellulose products. Includes tabulated data of microscopical and chemical characteristics, as well as pulping characteristics, of some 40 species from British Guiana, British Honduras, Nigeria, Trinidad, S. Africa, and Tanganyika. Another table gives data relating to the beating effect on pulps obtained from four of these woods.

4375. PETERI, R. **Pulping studies with African tropical woods.** *Tappi* 35 (4), 1952 (157–60). P.R.

An account of research and industrial trials by the French Régie Industrielle de la Cellulose Coloniale (R.I.C.C.), founded in 1944.

4376. JENSEN, W., and RAINIO, P. Björk som råmaterial för massaframställning. IV. Kolhydratkedjornas längdfördelning hos björksulfitmassa jämförd med gransulfitmassa. **[Birch as raw material for pulp. IV. The length distribution of the carbohydrate chains in Birch and Spruce sulphite pulps.]** *Pap. ja Puu* 34 (3), 1952 (53–6). 9 refs. [Sw.e.] P.R.

The chain length distribution shows the same general features in both Birch and Spruce dissolving pulps.

4377. RAMBO, W. H., and DERICE, H. A. **Woodmill log handling in the pulp and paper industry on the West Coast.** *Tappi* 35 (3), 1952 (100–7). P.R.

Describes and illustrates the most recent log-handling devices: log hauls, log transfers, roll conveyors, log loading and handling equipment, and bandmill installations, as well as devices for the hydraulic barking and chipping of whole logs.

4378. MCKEE, W. F. **The effect of wood handling and chip preparation on sulphite pulp yield and quality.** *Pulp Paper Mag. Can.* 53 (3), 1952 (237–41). 12 refs.

Summarizes results of research at one mill on the effect of species and wood quality, handling of wood before and after reaching the mill, chip uniformity and chipper damage on yield and quality of pulp.

4379. RYS, L., ARON, G., and OVERBAECK, W. **The influence of chipping on the properties of Paraná Pine sulphite pulp.** *Tappi* 35 (4), 1952 (147–56). 8 refs. P.R.

The loss of mechanical strength during the drying of sulphite pulp made from Paraná Pine, and very likely from other woods also, is caused by mechanical damage which occurs during the chipping. This damage of the wood structure is the reason for the chemical deterioration of the cellulose fibre during the cooking with sulphite liquor, resulting in its ready breakage before and during the mechanical treatment. Pulp from hand-chipped wood has longer fibres, less fines, a higher viscosity, and higher strength values, and maintains its strength during the drying as compared with mill-chipped wood pulp. *From authors' summary.*

4380. MARTIN, J. S., and BROWN, K. J. **Effect of bark on yield and quality of sulphate pulp from Southern Pine.** *Tappi* 35 (1), 1952 (7–10). 1 ref. P.R.

Tests show that a considerable % of bark can be used in kraft-type pulps but that sulphate pulps made from bark alone are unsuitable for use in paper products.

4381. MARTIN, J. S. **Sulfate pulping of Ponderosa Pine thinnings.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1909, 1951. pp. 3 + 3 tbls. P.R.

Sulphate pulping characteristics and pulp strength of material from Ponderosa Pine thinnings were very similar to those for Jack Pine.

4382. BROUNSTEIN, C. J. **A review of lesser-known pulping methods.** *Pulp Paper Mag. Can.* 53 (3), 1952 (247–58, 263). 106 refs.

Includes accounts of sulphite and nitric acid pulping; pulping with alcohols, phenols, dioxane, and organic acids; alkaline systems; 'neutral' systems; and systems involving halogen compounds. Data on the various methods are given in 19 tables,

4383. NEALE, F. R., PEARSON, A. J., and SOMERVILLE, *I*, L. **Strengthening Eucalypt groundwood by alkalis, and bleaching with hypochlorites.** *Paper Tr. J.* 134 (7), 1952 (22–30). 11 refs. P.R.

The reaction of alkalis with groundwood resulted in an increase of strength and a decrease of bulk and freeness. NaOH and KOH were more effective than $Ca(OH)_2$ and NH_4OH. NaOH removed two groups of substances from the groundwood. Removal of the first group, including strongly coloured substances, caused small increases in strength, while the removal of the second group, probably including hemicellulose, caused much larger increases in strength. The removal by NaOH of alkali-soluble colouring matter greatly improved the response of the groundwood to bleaching by hypochlorites.

Fibreboards

See also No. 4232.

4384. FICKLER, H.-H. Der Stand der Entwicklung von Prüfungsrichtlinien für die Eigenschaften von Holzfaserplatten. **[The present position in the development of suitable methods for testing the properties of wood-fibre boards.]** *Svensk PappTidn.* 55 (5), 1952 (153–72). 13 refs. [G.sw.e.] P.R.

Describes the methods used in various countries for testing physical, strength and working properties, and resistance to fire, chemicals, insect and fungus damage, and outlines the recommendations made by the F.A.O. conference on mechanical wood technology (Austria 1951).

4385. **Methods of test for wood chip boards, wood waste boards and similar boards.** *Brit. Stand.* No. 1811, 1952. pp. 15 + 1 photo. P.R.

4386. WALTON, C. L. **The manufacture of insulation board [in the U.S.A.].** *Paper Tr. J.* 134 (7), 1952 (30, 32–5). P.R.

4387. HOHF, J. P. **Board materials from sawdust and shavings.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1666–21, 1951. pp. 2. P.R.

Brief account of the newer methods.

4388. KOLLMANN, F. Herstellung halbschwerer Holzspanplatten im Trockenverfahren. [**Manufacture of medium-weight chipboards by a dry method.**] *Holz Roh- u. Werkstoff* 10 (4), 1952 (121–34). 16 refs. [G.g.] P.R.

A comprehensive, illustrated account of modern methods of manufacturing medium-weight chipboards (sp. gr. 0·400–0·850), especially boards of sp. gr. 0·500–0·700, without cooking. Medium-weight chipboards, made in large sizes, have a planar quasi-isotropy owing to the chaotic arrangement of the 'chips'. Their properties depend upon (1) proportion and kind of binder, (2) pressure applied, and (3) form and size of 'chips'. Long, flat 'chips' give a higher bending strength than short, cylindrical ones. Wide, smooth 'chips' give a smooth surface, while narrow curled ones are easily felted. Large 'chips' cause the formation of loosely-knit spots. Sawdust yields boards with small mechanical strength, even when the binder proportion is relatively high. Fine wood-flour cannot be used for the manufacture of chipboards. The best results are obtained with shavings from planing and peeling, and from comminuted veneer waste. Various machines for (1) peeling to obtain wide and smooth shavings, (2) preliminary comminution, (3) comminution with centrifugal mills (disintegrators) and by chip-cutting, are described and illustrated. Machines for the drying of 'chips' and for mixing them with binders and final processing machines are also described. The usual binders (proportion not over 10%) are synthetic resins of the phenol and urea type. The working pressure for the medium-weight chipboards varies between 7 and 25 kg./sq. cm.

4389. GOSS, W. C. (to United States Sheetwood Company, Seattle, Wash.). **Method of manufacturing sheet wood.** *U.S. Patent* No. 2,581,652, Jan. 8, 1952. pp. 6 + 4 dgms. P.O.

A semi-colloidal bonding agent is produced by wet grinding of wood that has decayed to a condition of brown rot, and the sheets are then made by the usual compression of loosely matted pads between the platens of a steam-vented press at 250–550° F.

4390. CENTOLA, G., and PANCIROLLI, F. **Research in the field of manufacture of fibreboard [from wood waste].** *Transl. Commonw. sci. industr. Organ., Aust.* No. 1583, 1951. pp. 10. 13 refs. *Transl.* by M. Slade from *Industria della Carta, Milano* 4 (4), 1950.

Discusses the chemical and mechanical processes involved in the manufacture of fibreboard from pulp, with or without adding extra lignin, by pressing at high temperatures.

4391. ELMENDORF, A. **Hardboard used in the furniture industry.** *Wood Wkg. Dig.* 54, May, 1952 (75–80, 82–3). P.R.

Discusses the use of hard fibreboards for (*a*) panels (varnished, enamelled, or left unfinished), (*b*) cores of veneered panels, and (*c*) crossbanding in 5-ply panels having lumber cores.

862. *Textiles and Cellulose Derivatives from Wood*

4392. HAAS, H., BATTENBERG, E., and TEVES, D. **The characteristics of wood pulps for use in the manufacture of viscose.** *Tappi* 35 (3), 1952 (116–24). 14 refs. P.R.

4393. SIMMONDS, F. A., and KINGSBURY, R. M. **Viscose-rayon pulps from Chilean hardwoods Coigue, Tepa, and Ulmo.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1906, 1951. pp. 16 + 7 tbls. 36 refs. P.R.

A study was made of the possibility of producing pulp of viscose-rayon grade from Coigue [*Nothofagus dombeyi*], Tepa [*Laurelia serrata*], and Ulmo [*Eucryphia cordifolia*]. Unbleached pulps were made by (1) the neutral sulphite semichemical process with and without steam prehydrolysis, (2) a water-prehydrolysis sulphate process, and (3) the sulphite process. These pulps were purified by means of the conventional sequence of chlorination, alkaline extraction, oxidation, and acidic extraction. Yields of purified pulps, which contained 2–7·5% of pentosans, ranged from 38 to 45% of the woods. Results of filtrability tests of viscose solutions from two of the pulps, of spinning trials on four, and the general similarity of all of the pulps in chemical composition, indicated that pulps acceptable for continuous-thread viscose rayon can be produced from the three woods by any of the processes investigated. *From authors' summary.*

863. *Wood Hydrolysis. Saccharification*

4394. STRANKS, D. W. **Microbiological degradation of lignocellulose material.** *Pulp Paper Mag. Can.* 53 (3), 1952 (220–4). 16 refs.

Discusses and presents data from literature on the possibility of using finely divided wood waste after fermentation. Presents some limited experimental material on the use of rumen organisms in fermenting wood waste [cf. *For. Abstr.* 13 (Nos 1534, 4215)] and discusses work by the Ottawa laboratory on its use as cattle fodder.

864. *Utilization of Lignin*

4395. LIPSITZ, P., and LOLLAR, R. M. **The improvement of the tanning potential of lignin by chemical modifications.** *Journal of the American Leather Chemists' Association, Easton, Pa.* 46 (5), 1951 (301–17). 35 refs. L.S.

Five water-insoluble and one water-soluble lignin derivatives obtained from lignin by chemical modifications designed to increase their H-bonding ability, were used to tan calfskin, and yielded leathers having characteristics not obtainable with the unmodified lignosulphonate tannage (increased shrinkage temperature, and resistance to enzymatic hydrolysis). A bisulphated Mg lignosulphonate resorcinol condensate is an excellent water-soluble tanning material.

865. *Plastics*

See No. 4327.

866. *Utilization of Wood Extractives*

See Nos. 4216, 4219.

867. *Destructive Distillation*

See also No. 3917.

4396. MABESA, C. **Construction and operation of a charcoal oven.** *Philipp. J. For.* 6 (4), 1952 (349–61).

Explains the construction and operation of an earthen kiln, a modification of a Japanese kiln, with the advantage of shorter time required to dry the dome (4–5 weeks compared with 3 months).

4397. SOCIÉTÉ ANONYME DES PÉTROLES JUPITER. Procédé de carbonisation des végétaux ligneux et appareil pour son application. **[Carbonization of ligneous substances and an apparatus therefor.]** *French Patent* No. 964,796, Feb. 8, 1950. pp. 3 + 2 dgms. [F.] P.O.

Branches, woody plants and cordwood etc., are ignited on a wide shallow funnel and when carbonized or semi-carbonized drop on to a plate in an enclosed space, where carbonization is completed in an atmosphere poor in O_2. The carbon is extinguished in an airtight container below the plate.

4398. LEWIS, H. C. **Distillation of wood and coal by the fluidized powder process.** *Research Engineer, Atlanta, Ga.* 1951/52 (1), (5–6, 17–9). 4 refs. L.S.

Describes a new process consisting essentially in contacting the solid substance with a gas by suspending the powdered solid in an upward moving stream of the gas under such conditions that the solid forms a dense, but highly agitated bed. This results in a very rapid heat transfer and, consequently, an almost complete disappearance of temperature inequalities within the bed. At the same time, the reactions involved in distillation occur much more rapidly owing to the greater surface area of powdered solids. [Cf. *For. Abstr.* 11 (No. 2117).]

4399. VROOM, A. H. **Bark pyrolysis by fluidization techniques.** *Pulp Paper Mag. Can.* 53 (5), 1952 (121–4). 8 refs.

Comminuted air-dry White Spruce bark was readily pyrolysed at temperatures up to 265 and 460° C., using the fluid-bed technique with N, CO_2 or superheated steam as the carrier gas. Results are tabulated. In this method, gas is passed at increasing speeds through a bed of ground bark until the whole bed is agitated and the surface of the bed appears like a violently boiling liquid. When this state is reached the gas pressure differential is roughly equivalent to the weight of the bed. The gaseous products, readily isolated when steam was used, contained principally CO, CO_2, CH_4 and some H. The yield was approximately 2·3 cu. ft./lb. dry bark and its heating value about 260 B.Th.U./cu. ft. for pyrolysis at 400°. The organic distillate amounted to about 20% and contained a complex mixture of compounds, including waxes, resins, phenols, and acetic acid. Another important product was 32–34% free-flowing, granular, easily pulverizable, pyrophoric charcoal with a fuel value roughly equal to that obtained by burning the equivalent weight of undried bark. The method appeared adaptable to continuous commercial operation in portable or large-scale installations. Experiments with Black Spruce, Balsam Fir and Douglas Fir barks have also been made and other barks should be equally suitable.

4400. ČERNENKO, A. A., and BORISOV, I. I. Ispoljzovanie drevesnoï smoly. **[Utilization of wood tar.]** *Za Ekonomiju Topliva, Moskva* 1950 (5), (35–6). [Russ.] D.S.I.R.

The wood tar obtained in gas-producing plants has high fuel value. It is recommended that the tar be dehydrated and separated by distillation into solid and liquid fuel. Either can be easily burnt in the usual furnaces. Distillation costs much the same as removing the tar to a dump.

4401. ONDA, K. **Utilization of wood-tar (III, IV, V).** *Journal of the Fuel Society of Japan, Saitama-Kawaguchi* 30 (295), 1951 (88–95). 13 refs. [Jap.e.] D.S.I.R.

In coking tests of pitches obtained from Pine-root oil in different ways it was found that treatment of the crude oil with air at a low temperature increases both the yield of pitch and its cokeability. Compression strength of briquettes in which Pine-oil pitch from air-bath distillation was used as binder also confirmed the effectiveness of air treatment. Analytical data showed that air treatment brought about not a simple oxidation but various polymerizations and decompositions.

89. OTHER ('MINOR') FOREST PRODUCTS

See also No. 4153.

892. *Vegetable Products*

892.1. Grass. Litter. Leaf Fodder

See also No. 4435.

4402. KOBLIC, J. **Vřes jako nouzové krmivo. [Heather as an emergency fodder.]** *Sborn. čsl. Akad. zeměd.* 24 (5), 1951 (423–7). 6 refs. [Cz.cz.russ.e.] C.G.B.

Presents results of a chemical analysis of *Calluna vulgaris*, used locally in Czechoslovakia as an emergency fodder. The dry substance contains: nitrogenous substances, 6·26; substances soluble in $(C_2H_5)_2O$, 8·28; non-nitrogenous extractives, 54·20; cellulose, 26·90; mineral substances, 4·34%.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 4213, 4380, 4395, 4399.

4403. **Bark studies: Lodgepole Pine bark.** [*Bienn.*] *Rep. Ore. St. For. 1948/49–1949/50*, [1950] (65–6).

Tannin from Lodgepole Pine bark was found to be suitable for tanning leather, but the content is too low to make extraction commercially practical.

4404. SCOTT, D. S., and GARDINER, J. A. F. **Economics of tannin production from sea-water floated Western Hemlock bark.** *B.C. Lumberm.* 36 (4), 1952 (51, 116 . . . 124). 15 refs.

In a preliminary estimate, the production cost of sulphited salt-free tannin extract of 5% moisture content was calculated to be 6·0 cents/lb. for a plant

capable of producing over 2,000 lb./year at full capacity. A corresponding selling price in E. Canada would be 12·4 cents/lb. Methods of processing are discussed. [Cf. *For. Abstr.* 12 (Nos. 1462–3).]

4405. **Ancient industry thrives on Tanbark Oak [*Lithocarpus densiflora*] in California's Humboldt County.** *Timberman* 53 (6), 1952 (82 . . 92).

Gives particulars of the collection of tanbark, with information on the chemistry of the bark, figures of bark yields, details of wood properties and kilning schedules, and information on the tanning process.

4406. ARRUDA, E. REZENDE DE. **O barbatimão. [*Stryphnodendron barbatimao.*]** *Arq. Serv. flor., Brasil* 4, 1950 (101–17). 10 refs. [Port.]

This tree has considerable commercial importance, from its tanbark, usually harvested in Brazil by stripping the trees after felling. The author describes the tree, its geographical distribution and silvicultural requirements, with notes on methods of raising from seed, planting out, and tannin extraction, and on the properties of the bark and the industrial processes used at the Cia. Extrativa de Taninos S/A.

4407. VÁHALA, J. **Škumpa ocetná jako možný zdroj domácích tříslovin. [*Rhus typhina* as a potential source of home-grown tannins.]** *Sborn. čsl. Akad. zeměd.* 24 (5), 1951 (377–88). 12 refs. [Cz.cz.russ.e.] C.G.B.

Presents results of a study on *R. typhina* leaves from five sites in Czechoslovakia and three foreign samples. Aerated and highly skeletal soils with a low watertable seem to produce the highest yield of tannins. The best aspect is SE. The variation in the composition and colour of the leaves is presented graphically. The best extraction temperature seems to be 45–60° C. It is claimed that tannin from *R. typhina* would compare favourably in Czechoslovakia with tannins from Fir bark, and still more so with artificial tannins, from the economic point of view. [Cf. *For. Abstr.* 12 (No. 634).]

4408. DEBAUN, R. M., and NORD, F. F. **Resistance of cork to decay by wood-destroying moulds.** *Arch. Biochem.* 33 (2), 1951 (314–9). 29 refs. O.R.S.

A new method, based on the colorimetric estimation of lignin released by autoclaving with alkali, was developed. This showed that cork (raw bark of *Quercus suber*) is very resistant to attack by brown-rot fungi.

4409. HERGERT, H. L., and KURTH, E. F. **The chemical nature of the cork from Douglas-Fir bark.** *Tappi* 35 (2), 1952 (59–66). 18 refs. P.R.

The main extractive components are: dihydroquercetin, waxes, tannin, and a carbohydrate substance which on hydrolysis gives glucose and galactose. The residue after extraction contains: (1) a fraction (82–85% of the dry weight) soluble in alkalis or dioxane/HCl reagent; and (2) a fraction of thin-walled, cellular material. The composition of each fraction is described. Douglas-Fir cork is chemically similar to Mediterranean Oak cork. The investigation has not substantiated the concept of linkages of cellulose and fatty acids in cork.

4410. **Chemical and microbial effects of unextracted and extracted Douglas Fir bark on soils and plant growth.** [*Bienn.*] *Rep. Ore. St. For. 1948/49–1949/50*, [1950] (81).

4411. UFFER, A. **Über die Inhaltstoffe von *Mansonia altissima* A. Chev. [The constituents of [bark of] *M. altissima.*]** *Helv. chim. Acta* 35 (2), 1952 (528–53). 12 refs. [G.g.] O.R.S.

4412. HUMPHREYS, F. R. **An investigation into the suitability of the fibres from the bark of Stringybarks for use in the manufacture of fibrous plaster.** Working plan. *Proj. For. Comm. N.S.W.* No. *CX*–7, 1951. pp.2. P.R.

4413. VESEY-FITZGERALD, L. D. E. F. **Miombo bark and its uses in East Africa.** *Kew Bull.* 1952 (1), (69–71 + 4 photos).

Describes the beehives constructed by nomadic natives from the bark of *Isoberlinia paniculata*, and other articles made from the bark of *Isoberlinia* sp. and *Brachystegia* sp.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

See also Nos. 3594, 3601, 4429.

4414. BALLY, P. R. O., MOHR, K., and REICHSTEIN, T. **Die Glykoside der Wurzelrinde von *Acokanthera friesiorum* (Markgr.). [The glucosides of the root bark of *A. friesiorum.*]** *Helv. chim. Acta* 35 (1), 1952 (45–50). Many refs. [G.g.] O.R.S.

0·424% acovenoside A was isolated from the root bark. Other glucosides were also present but have not yet been isolated.

4415. PARIS, R., and MOYSE-MIGNON, H. **Recherches sur les *Fagara* africains. III. Étude du *Fagara macrophylla* Engler. [Research on African *Fagara* species. III. Study of *F. macrophylla.*]** *Annales Pharmaceutiques Françaises, Paris* 9 (7/8), 1951 (479–93). 15 refs. [F.] L.S.

The following substances have been isolated from the root bark: (1) fagaramide, (2) a phytosterol, (3) a pungent, non-saturated nitrogenous compound, similar to herculin, (4) fagaridin (erythrofagarin), (5) another alkaloid (yellow, m.p. 278–280° C.) for which the name of xanthofagarin is suggested, and (6) an alkaloid melting at 209–211° C. Twig bark and leaves have also been examined. [Cf. *For. Abstr.* 11 (No. 2165).]

4416. HILLS, K. L., and RODWELL, C. N. **Variation in the alkaloids of clones of northern *Duboisia myoporoides* R. Br.** *Aust. J. sci. Res.* 4*B* (4), 1951 (486–99). 5 refs. P.R.

4417. MALAVOLTA, E., LEME, J. JR., GURGEL, J. T. A., and SOBRINHO, J. SOUBIHE. **Nota prévia sôbre conteúdo de vitamina C em 'cabeludinha' (*Eugenia tomentosa* Camb.). [Preliminary note on the vitamin C content of *E. tomentosa* [fruit].]** *Rev. Agric., Piracicaba* 26 (11/12), 1951 (403–4). 2 refs. [Port.e.] A.P.B.

4418. UKITA, T., and MATSUDA, R. **On an antibacterial compound contained in Fructus Juniperi japonicae. I. Isolation of the antibacterial compound.** *Journal of the Pharmaceutical Society of Japan (Foreign language ed.), Tokyo* 71 (10), 1951 (1050–2). 3 refs. [E.] L.S.

A compound obtained from the fruits of *Juniperus rigida* and *J. conferta* was found to have a remarkable antibacterial activity against *Staphylococcus aureus*. It could prevent the growth of the test organism in a dilution of 1 : 12,800 and 1 : 51,200, in broth and Knight's synthetic medium respectively. The antibacterial compound seems to be a diterpenic acid having the molecular formula $C_{20}H_{30}O_2$ with optical activity $[\alpha]_D^{23} = +11°$. *Authors' summary.*

4419. MORRIS, M. P. **Chemical studies [on insecticidal plants.]** *Rep. fed. Exp. Sta. Puerto Rico* 1951 (8–9).

Species which showed moderate to high toxicity in laboratory tests were investigated chemically. These included *Mammea americana* (fruit only), *Albizzia lebbek* and *A. stipulata.*

4420. SILLANS, R. Sur quelques plantes ichtyotoxiques de l'Afrique centrale. **[Some fish-poison plants of Central Africa.]** *Rev. int. Bot. appl. Agric. trop.* 32 (351/352), 1952 (54–65). 62 refs. [F.] P.R.

Describes a number of plants, including about 20 trees and shrubs, all or parts of which are used as fish poisons.

4421. MOHANTY, A. P. **Beedi leaf industry in Orissa.** *Indian For.* 78 (4), 1952 (212–6). 3 refs.

The leaves of *Diospyros melanoxylon* are much used for wrapping the tobacco in Indian cigarettes or beedis. The collection and curing of the leaves, and propagation of the tree by coppicing are described.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 3655, 3665, 3860–7, 4317.

4422. PEJOSKI, B. Refraktometriski ispituvanja na borovite balsami. **[Refractometric investigations on Pine balsams.]** *God. Zborn. zemj.-šum. Univ. Skopje* 2, 1948/49 (1951), (115–31). 13 refs. [Maced.maced.russ.f.]

Presents results of measurements of Pine 'balsams', of use in microscopic technique and the optical industry, viz. balsams obtained by filtration of the oleoresins of *Pinus nigra, P. sylvestris, P. peuce, P. leucodermis*, and *P. halepensis*. Their refractive index varied from 1·516 to 1·520, the values being independent of the time of filtration. The table of refractive indices also includes data for Canada balsam, 'Cedar oil', and 4 synthetic balsams. As far as the refractive index is concerned, all Pine balsams compare favourably with the materials now in use in optics and microscopy.

4423. MIROV, N. T. **Composition of gum turpentine of Pines. XII. A report on *Pinus montezumae, P. oocarpa*, and *P. leiophylla*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 40 (11), 1951 (550–1). O.R.S.

Cf. *For. Abstr.* 13 (No. 1731).

4424. HAAGEN-SMIT, A. J., WANG, T. H., and MIROV, N. T. **Composition of gum turpentine of Pines. XIII. A report on *Pinus albicaulis*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 40 (11), 1951 (557–9). 3 refs. O.R.S.

4425. SHAW, A. C. **The preparation and composition of the Canadian coniferous oils.** *Pulp Paper Mag. Can.* 53 (4), 1952 (119–21). 2 refs.

Oil was distilled from leafy branches of 10 conifers and of *Myrica asplenifolia*, and from cones of *Tsuga canadensis, Picea glauca* and *Pinus sylvestris*. Results are tabulated. Oils with good to excellent odours, and of commercial value, were obtained in satisfactory yields from branches and foliage of *Tsuga canadensis, Picea mariana, Thuja occidentalis* and *Abies balsamea*. Yields obtained by laboratory and commercial distillation were compared and were consistently much higher for the former. Samples of the oil from the above four species were submitted to fractional distillation. The composition of the oils from *P. mariana* and *Tsuga canadensis* is similar. They contain important amounts of bornyl acetate, present in small amounts in the other two oils. The most valuable constituent of oil from *Thuja occidentalis* is thujane, also present in unimportant amounts in oil of *Tsuga canadensis*. [Cf. *For. Abstr.* 13 (No. 1733).]

4426. NOZOE, T., YASUE, A., and YAMANE, K. **On the acidic constituents of the essential oil of *Thujopsis dolabrata*. Occurrence of α-thujaplicin.** *Proceedings of the Japan Academy, Tokyo* 27 (1), 1951 (15–7). 9 refs. [E.] O.R.S.

4427. BRIASCO, J. D., and MURRAY, J. **Essential oils of New Zealand Podocarpaceae. I. *Dacrydium colensoi*.** *J. appl. Chem.* 2 (4), 1952 (187–92). 27 refs. P.R.

The essential oil of *D. colensoi* has been shown to contain at least 16 constituents, 10 of which have been identified with known compounds: α-pinene, myrcene, limonene, terpinolene, longifolene, muurolene, cadinene, macrocarpol, phyllocladene, and *iso*-phyllocladene.

4428. BRADLEY, C. E., and HAAGEN-SMIT, A. J. **The essential oil of *Bursera microphylla*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 40 (11), 1951 (591–2). 12 refs. O.R.S.

The essential oil of leaves and twigs consists of 80% terpenes, 9% sesquiterpenes and oxygenated compounds, and 8% gums and resins.

4429. ZEMLJANICKIĬ, L. T. Perspektivy ispoljzovanija amorfy v agrolesomelioracii i promyšlennosti. **[Prospects for the utilization of *Amorpha fruticosa* in agricultural forestry and in industry.]** *Bot. Ž.* 36 (3), 1951 (299–302). 3 refs. [Russ.] I.M.I.

This leguminous shrub has been recommended for shelterbelt plantations on soils of the chestnut-earth/solonets complex and for sands in the steppe zone. It is unexacting in its demands on the soil, drought-resistant, probably long-lived, and coppices well, but it will not stand severe frost and is therefore suitable only for the steppe zone of the U.S.S.R. The shoots can be used for making baskets and wickerwork; in unforested areas they would make valuable fuel. Abundant fruit is produced annually from the 2nd and 3rd year of life onward. In preliminary studies of the fruit yield of bushes used in shelterbelt borders, the average per bush varied from 150 g. on a light-chestnut solonized clay-loam to 422 g. on a dark, more fertile soil at Zavetnensk, and 833 g. on an eroded light-textured clay-loam light-chestnut soil near Stalingrad. If plantations were made at a

density of 10,000 bushes/ha., their yield might therefore be from 1·5 to 8·3 tons/ha. Dry seeds contain 10·5% of crude fat (oil), compared with 16·4% for soya beans. The oil is a semi-drying one of the poppyseed-oil type; it could be used in the paint and lacquer industry instead of sunflower oil, and in the soap industry. The extracted seed meal contains 4·37% of protein N (equivalent to 27·3% of crude protein), ca. 12·5% water-soluble carbohydrates, and ca. 6·4% starch; it should therefore be suitable as a raw material for fermentation to alcohol. The pods, which make up ca. 35% of the total weight of the fruit, contain essential oils (not analysed) which might find some application in perfumery and medicine. The extraction residue of the pods, after steam distillation of the essential oil, yields a wax-like product. A balsam, similar to balsam of Peru, is obtained when the pods are extracted with ether without previous steam-distillation of essential oils. Ether extraction of ground whole fruits yields 'medicinal *Amorpha* oil', which has antiseptic properties and assists wound healing. Assuming an annual fruit crop of 5 tons/ha., the products would be 350 kg. of oil, 3 tons of extracted seed meal, 30 litres of essential oil and 260 kg. of balsamic resins. If the equivalent fruit crop were ground whole and converted to 'medicinal *Amorpha* oil', the yield of the latter should be ca. 750 kg.

4430. IRMAY, H. DE. La palmera 'Cúsi' y el aceite de 'Babassú'. Un gran recurso forestal de Bolivia, *Orbignya phalerata*, Martius. [The Cúsi palm, and Babassú oil. *O. phalerata*, an important forest product of Bolivia.] *Bol. for. Univ. 'San Simon', Cochabamba* No. 2, 1949. pp. 16 + 1 map + 1 plate. 12 refs. [Span.]

Presents some data on Babassú oil production in Brazil between 1939 and 1944, the oil content of different parts of the fruit, the properties of the oil, and the tree's distribution in the 'Misiones de Guarayos' area (Bolivia); discusses the possibilities of growing it in plantations; and presents an estimate of returns from a plantation of 30,000 ha.

4431. MACLEAN, J. A. R. **Oil-bearing seeds of possible economic importance to West Africa.** *Nature, Lond.* 169 (4301), 1952 (589–90). 4 refs.

Gives results of analyses of seed oil of *Herrania balãensis*, *H. mariae*, and *H.* sp.

4432. HIRST, E. L., and JONES, J. K. N. **Chemistry of the plant gums.** *Research, Lond.* 4 (9), 1951 (411–7). 26 refs. O.R.S.

4433. SUKAČEV, V. N., and PRAVDIN, L. F. [Editors]. Bereskiet kak guttaperčenos i naučnoe obosnovanie ego kuljtury i èksploatacii (Materialy 1-go soveščanija po bereskletu, sozvannogo Institutom lesa AN. SSSR 26–27 fevralja 1945g). [***Euonymus* as a source of guttapercha and the scientific bases of its cultivation and utilization. (Papers delivered at the 1st *Euonymus* conference, convened by the Institute of Forests of the U.S.S.R. Academy of Sciences, 26–27 Feb., 1945).**] *Trud. Inst. Lesa* 1 (1), 1947. pp. 197. Numerous refs. [Russ.]

Contains papers on: Immediate problems of research on the gutta-percha-bearing species of *Euonymus* (*L. F. Pravdin*). Distribution of *E. verrucosus* in the forests of Russia in Europe; and Boundaries of the natural range of *E. europaeus* in Russia in Europe (*A. L. Koščeev*). Distribution of *E. verrucosus* as related to forest types, and its edaphic and phytocoenological area; and Natural regeneration of *E. verrucosus* in the Buzuluk forest (*I. D. Jurkevič*). The question of the maximum gutta-percha content of *Euonymus* spp. (*G. G. Bossè*). Investigation of the conditions of gutta-percha formation in *E. verrucosus* (*A. I. Ahromeïko* and *N. P. Krasulin*). Distribution of gutta-percha along the roots of *E. verrucosus* (*A. V. Savina* and *N. P. Krasulin*). Methods of calculating the yield of root bark of *Euonymus* (*F. P. Moiseenko*). Significance of the thermal factor in hastening the germination of *Euonymus* seed (*A. N. Stratonovič*). *Euonymus* and its cultivation (*B. V. Grazdov*). Raising high-yielding *E. verrucosus*, and the creation of seed plantations for this species (*A. S. Jablokov*). A method of raising denser *Euonymus* plantations (*N. H. Stratonović*). An experiment on the application of fertilizers to natural *E. verrucosus* thickets (*S. S. Lisin*). Selection of *E. verrucosus* and ways of creating a highly productive source of raw material for the gutta-percha industry (*R. F. Kudaševa*). Bibliography of literature on *Euonymus* spp. as a source of gutta-percha (*G. G. Bossè*). Resolutions of the conference (*V. N. Sukačev* and *S. A. Nikitin*).

4434. MORROW, R. R. **Consistency in sweetness and flow of Maple sap.** *J. For.* 50 (2), 1952 (130–1). 3 refs. [New York State College of Agriculture, Cornell University, Ithaca.]

Measurements of sap quality and quantity were made for five years in a sugar bush near Geneva, N.Y. Little correlation was found between the amount of sap produced and the sugar concentration. A sweet tree tends to remain sweet, and a big producer to remain a big producer. Sugar bush often needs thinning, and a sap hydrometer, which measures sugar% in a bucket of stirred sap, may be used to help in selection of the poorer trees for removal. Amount and sweetness of sap should be determined near the middle of the season; trees to be compared should be measured on the same day, since quantity and sweetness of sap often change from day to day; if possible, measurement should be made twice a season for three years. [Cf. *For. Abstr.* 11 (No. 1401), 13 (No. 825).]

892.7. Fruits, Seeds. Fibres, Yarns and Flosses

See also Nos. 3665, 4417–9, 4429–31.

4435. KOBLIC, J. Koňské kaštany jako nouzové krmivo. [**Horse chestnuts as emergency fodder.**] *Sborn. čsl. Akad. zeměd.* 24 (5), 1951 (428–32). 7 refs. [Cz.cz.russ.e.] C.G.B.

The results of chemical analysis of horse chestnuts are presented, and the main, and toxic, components pointed out. A method of removing the toxic components is outlined. A review of studies on horse chestnuts, their composition, and use as fodder is included.

892.8. Heather, Broom, etc. Osiers. Canes and Bamboos

See No. 4402.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

See also No. 3553.

90. GENERAL

4436. GALOUX, A. Les grands problèmes de sylviculture en Belgique. [**The principal forestry problems in Belgium.**] *Bull. Soc. for. Belg.* 59 (2), 1952 (90–113 + 14 photos). [F.]

Discusses the following subjects: forestry in the Campine; coppice with standards; the Beech woods of the Central Ardennes; Spruce in the Ardennes; and improvement of the quality of production.

4437. COLLIER, F. S. **Report of the Forestry Adviser to the Secretary of State for the Colonies on his visit to the Federation of Malaya and Singapore in April-May 1951.** *Malay. Forester* 15 (1), 1952 (2–12).

The report is arranged under the heads: land use; forest management; inland silviculture; Mangrove management; forest utilization; research; and staff.

902. *History of Forests and Forestry*

See also Nos. 4441–2, 4446.

4438. B., R. L'âge de nos forêts. [**The age of our forests.**] *Rev. Bois Appl.* 7 (4), 1952 (26). [F.]

Despite its light and not very fertile soil, the Seine valley was intensely cultivated in Celtic and Gallo-Roman times. The 'forest wave' set in not earlier than late in the 3rd century A.D. after the Germanic invasion had largely destroyed the agricultural settlements. By the 10th century, a continuous forest extended along the whole course of the Seine. These forests, royal at first, then seigneurial, and royal again since the 13th century, were hunting grounds for their owners, and from the 14th century also furnished timber for shipbuilding.

4439. GUINIER, P. Le régime forestier au Liban au II[e] siècle. [**Forestry in Lebanon in the 2nd century A.D.**] *Rev. for. franç.* 1952 (3), (141–4 + 4 photos). 5 refs. [F.]

903. *Forest Policy, General*

See also No. 4446.

4440. HORTON, K. W. **Editorial.** *Annual Ring* No. 5, 1952 (8–9).

Indicates briefly the extent to which the recommendations of the Kennedy Report on forestry in Ontario have been implemented.

4441. SWABEY, C. **Note on the development of forest policy in British Guiana.** *Carib. For.* 12 (4), 1951 (159–70). [E.Span.]

A historical survey, with suggestions for future policy.

4442. KENNEDY, D. **New Zealand forest practice—review and preview.** *N.Z. J. For.* 6 (3), 1951 (189–99).

Reviews the progress of forestry in New Zealand 1920–50, and discusses thinning policy in some detail.

4443. [**Policy and immediate working plan for the five-year Reafforestation Development Scheme [in the Seychelles].**] *Rep. Dep. Agric. Seychelles 1950*, [1951] (18–9).

904. *General Regional Accounts of Forests and Forestry*

See also No. 4463.

4444. LEFEBVRE, RABOUILLE, and VALETTE. Forêts d'Écosse. [**The forests of Scotland.**] *Rev. for. franç.* 1952 (3), (186–209). [F.]

Observations made during a tour in 1950.

4445. Numéro special sur le Maroc. [**Special number on Morocco.**] *Rev. for. franç.* 1952 (4), (221–87 + 19 photos). [F.]

Includes articles on the following: forestry in Morocco (*C. G. d'Esdra*); forest legislation in Morocco (*P. Boulhol*); the forestry circle of Demnati in 1951 (*Pruvost*); details of forest management [mainly regeneration and grazing] in Morocco (*P. Vidal*).

4446. BOUDY. L'oeuvre forestière de la France au Maroc. [**French forestry achievements in Morocco.**] *C.R. Acad. Agric. France* 38 (3), 1952 (103–15). [F.] A.P.B.

A brief review of the forests and of forest policy and achievements in Morocco since 1913.

4447. MARSHALL, C. **Report on forestry in American Samoa.** Pacific Science Board, National Research Council, Washington, D.C. 1951. pp. 172. 34 refs.

Contains an index of shrubs and trees (pp. 40–138) and notes on silviculture and utilization of the important tree species (pp. 139–53).

4448. THOMPSON, T. S. **Fiji journey—Viti Levu.** *N.Z. J. For.* 6 (3), 1951 (236–43 + 5 photos).

An account of forests and forestry in the island.

905. *Forest Statistics and Resources*

See also Nos. 3645, 4136–7, 4140.

4449. SARICH, B. R. **Yugoslavia's forest resources.** *Foreign Comm. Wkly.* 46 (4), 1952 (3–4). A.P.B.

Gives figures for forest area, tree species, increment, exploitation, consumption, and exports.

4450. LANGSÆTER, A. Skogens tilvekst i Norge, hogstkvantum i de nærmeste år og skogindustriens virkesforsyning. [**Forest increment, the amount available for felling in the next few years, and the timber requirements of the forest industries in Norway.**] *Norsk Skogind.* 6 (2), 1952 (38–44). [Nor.e.] P.R.

Gives figures showing increment and timber requirements and suggests methods of reducing the gap by (1) exploiting forests at present inaccessible; (2) increasing the use of slabs; (3) reducing the amount of softwood used as fuel; (4) surveying domestic use on farms; (5) using tops and damaged wood; and (6) increasing the use of hardwood.

4451. RONGE, E. W. **Sveriges skogstillgångar. [Sweden's forest resources.]** *Skogen* 38 (12), 1951 (253, 270). 1 ref. [Sw.]

Summarizes the results of the second national forest survey.

4452. Domänverket år 1950 av Kungl. Domänstyrelsen. **[Work in the State Forests, 1950, by the Royal State Forestry Board.]** *Sveriges Officiella Statistik: Skogshushållning.* Kungl. Boktryckeriet. P. A. Norstedt & Söner, Stockholm. 1952. pp. 225 + map. [Sw.]

4453. MOLTESEN, P. **Statistik og kalkuler over hugsten i Danmarks skove og plantager. [Statistics and calculations on fellings in Denmark's forests and plantations.]** *Repr.* from *Træindustrien, København* April, 1952 (43–9). [Dan.]

Gives tables and graphs showing fellings from 1931–2 to 1949–50 and estimated fellings up to 1976 by species, assortments and districts of Denmark. [Cf. *For. Abstr.* 10 (No. 862).]

4454. MAYER, K. R. **Forest resources of Liberia.** *Agric. Inform. Bull. U.S. Dep. Agric.* No. 67, 1951. pp. 69. 13 refs.

Describes extent, composition, volume, growth and drain of the forests, and problems of protection.

4455. LAVAGNINO, R. Recursos forestales de Guatemala. **[Forest resources of Guatemala.]** [*Publ.*] *Dirección General Forestal, Ministerio de Agricultura, Guatemala* 2 (21), 1949. pp. 14. [Span.]

Presents data on the extent of the forests, causes of deforestation, forest industries and timber production, with a list of vernacular names and their scientific equivalents for the most important timber trees.

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also Nos. 3558, 3574 *et seq.*

4456. KUCERA, C. L. **Composition and environmental interactions of a natural forested area of central Iowa.** *Abstr. of thesis,* in *Iowa St. Coll. J. Sci.* 26 (2), 1952 (233–4). O.R.E.

Studies were made of the influence of a number of hardwood communities on soil-chemistry, moisture, and texture, and on snow melt, evaporation, and wind movement.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 4470–1, 4483.

4457. CHAMPION, H. G. **The place of forestry in the countryside.** *Ctry. Life, Lond.* Mar. 9, 1951 (692–4).

Discusses the rôle of forestry in a well planned land-use policy.

4458. VAHID, S. A. **Forestry and agriculture in Pakistan.** *Pakistan J. For.* 2 (1), 1952 (13–31).

A review of the situation by the Inspector General of Forests, Pakistan.

4459. JACQUES-FÉLIX, H. **Géographie des dénudations et dégradations du sol au Cameroun. Conditions physiques et humaines. [The geography of deforestation and soil degradation in the Cameroons. Physical and biotic conditions.]** *Bulletin Scientifique, Ministère de la France d'Outre Mer* No. 3, 1950. pp. 96 + 16 plates. [F.f.]

The first part of the bulletin deals with vegetation, its degradation and the causes (shifting cultivation, pressure of population, bush fires); the second part describes the soils, their degradation, and the causes (removal of vegetation, rain, and fire).

4460. GLOVER, SIR H. **A tour in Latin America.** ***Contd.*** *Emp. For. Rev.* 30 (3), 1951 (250–5 + 19 photos); 31 (1), 1952 (35–8 + 14 photos).

The first of these instalments deals with land use in Colombia, Jamaica, and Cuba, and the second with Mexico. [Cf. *For. Abstr.* 13 (No. 1769).]

4461. **Forestry and marginal lands. Symposium on marginal lands: Royal Society of New Zealand, Seventh Science Congress, 1951.** *N.Z. J. For.* 6 (3), 1951 (244–9).

Summarizes the following papers: Forestry in relation to marginal land use in New Zealand: general principles (*A. P. Thompson*); Relationship of forestry and marginal land in the southern North Island (*G. H. Hocking*); Forestry on the Auckland gumlands (*A. D. McKinnon*); Marginal land problems of *Nothofagus* forest soils (*J. T. Holloway*); Exotic forestry in the South Island (*A. D. McKinnon*); and Exotic plantations on Moutere soils (*J. G. Verey* and *C. Biggs*).

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

4462. BESLEY, L. **Viewpoints on forest tenure.** *Pulp Paper Mag. Can.* 53 (3), 1952 (312 . . . 22).

Compares land ownership systems in Europe and the U.S.A. with that in British Columbia.

922. *Publicly Owned Forests*

4463. **Britain's forests: Thetford Chase.** Forestry Commission, London. 1952. pp. 18. Price 1*s.*

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also Nos. 3859, 3952–3, 4012, 4445.

4464. PRINGLE, S. L. **Methods to promote better forestry on private lands.** *Rep. Marit. Sect. Canad. Inst. For. 1950/51,* 1951 (59–80).

A review of legislation to protect forest land from misuse, in Delaware, Virginia, Maryland, New Hampshire, Massachusetts, Michigan, Minnesota, Wisconsin, Denmark, Sweden and Norway.

4465. QVIST, A. **Forestry Act 1951: tree preservation orders and compensation.** *J. Land Agents' Soc.* 51 (5), 1952 (195–6).

Discusses the effect of the Act on Tree Preservation Orders.

4466. RÄSÄNEN, K. A. **Metsänhoitoyhdistyslain nykyinen toteuttamisvaihe. [The present position as regards the implementation of the law relating to local**

associations of forest owners.] *Metsät. Aikak.* 1951 (10), (261). [Fi.e.]

Discusses briefly the duties and responsibilities of different organizations and individual forest owners under a law which comes into effect on 1 Jan. 1952.

4467. Leyes vigentes para la protección y la repoblación de los montes nacionales. **[Laws in force for the protection and regeneration of the national forests [of Cuba].]** Ministerio de Agricultura, Dirección de Montes, Minas y Aguas, Havana. 1946. pp. 200. [Span.]

4468. **Oregon forest laws 1951.** State Forester, Oregon. [1952?]. pp. 166.

Cf. *For. Abstr.* 10 (No. 3039).

4469. Direito florestal—estudo e literatura sôbre a matéria. **[Forest law, a study of the subject, with bibliography.]** *An. bras. Econ. flor., Inst. nac. Pinho* 3 (3), 1950 (65–8). 101 refs. [Port.e.]

A general discussion of the Brazilian situation, with a comprehensive bibliography covering Italy, France, Germany, Argentina and Colombia.

4470. Régimen legal del Instituto de Parcelaciones, Colonización y Defensa Forestal. **[The laws governing the Institute of Land Distribution, Colonization and Forest Conservation.]** *Tierras y Aguas* 10 (109), 1948 (835–80). [Span.]

The text of the decrees by which the Colombian Institute was set up and its constitution and functions established.

4471. **An Act to provide funds for reforestation and afforestation of denuded areas and cogon or open lands within forest reserves, communal forests, national parks, timber lands, sand dunes, and other public forest lands in the Philippines etc.** *Philipp. J. For.* 6 (4), 1952 (383–94).

4472. BOARDMAN, W. **The trend of forest law.** *N.Z. J. For.* 6 (3), 1951 (199–218).

A review of legislation affecting forests and forestry in New Zealand from 1841 to the present time.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

941. *State Subsidies etc.*

See No. 3848.

944. *Co-operation. Collaboration of Forest Owners*

See No. 4466.

945.1. *Advisory and Information Services. Documentation Centres*

4473. FRAUENDORFER, S. **Das Dokumentationsproblem und die Holzforschung. [The problem of documentation and wood research.]** *Mitt. öst. Ges. Holzforsch.* 4 (2), 1952 (9–13). [G.] P.R.

A brief account of the development of documentation on forests and timber, with analyses of the Flury and Oxford decimal classifications. Documentation work in international and national European organizations is described.

4474. PISARSKA, M. Zagadnienie dokumentacji naukowo-technicznej w leśnictwie. **[The problem of scientific and technical documentation in forestry.]** *Sylwan* 96 (1), 1952 (75–82). [Pol.]

A Central Institute for Scientific and Technical Documentation was established in Poland in 1950. Subordinated to the National Committee for Economic Planning, it controls the activities of some 50 special documentation centres, one of which, covering forestry documentation, is entrusted to the Forestry Research Institute at Warsaw. Some documentation activities were conducted before the war by the library of the General Management of State Forests. This library, or rather its remains, became the nucleus of the new library of the Forestry Research Institute in 1945. All publications are classified according to UDC and the Flury system.

945.3. *Education. Training*

4475. ANDERSON, M. L. **An outline of possible developments in higher forestry education.** *Scot. For.* 6 (2), 1952 (47–52).

4476. SAATÇIOĞLU, F. Istanbul Üniversitesi Orman Fakültesi (Tarihçe-Öğretim-Organizasyon). **[The Forestry Faculty at the University of Istanbul (history, courses and organization).]** *Istanbul Üniv. Orm. Fak. Derg.* 1*A* (1), 1951 (1–86 + 20 plates). [Turk.g.e.]

A full account of the history and organization of teaching in forestry at Istanbul University, presenting details of the syllabus and staff, also an account of the organization of forestry research, which is financed by the state and co-ordinated by a Central Forest Research Institution.

4477. JACOBS, M. R. **Forestry education in Australia.** *Aust. J. Sci.* 14 (1), 1951 (2–6). O.B.D.

A review of the organization and curriculum of undergraduate training for professional foresters in Australia.

945.4. *Research*

See also Nos. 3574, 3663, 3720–2, 4146, 4239–40, 4476.

4478. PAVARI, A. **Il centro di studio sul castagno. [The Centre for Chestnut Research, Florence.]** *Pubbl. Cent. Stud. Castagno, Firenze* No. 1, 1951 (1–14). [It.F.E.G.]

The Centre for Chestnut Research (*Centro di Studio sul Castagno*), attached to the Forest Experiment Station at Florence, began work in 1951 under the direction of Prof. Aldo Pavari and has issued this its first publication. The immediate programme of research covers the following subjects: Ecology and distribution of the genus *Castanea*; studies of Italian Chestnut stands, their structure, volume, increment etc.; Italian varieties of *C. sativa*; silvicultural technique; utilization. Research on *Endothia parasitica* disease and breeding of disease-resistant Chestnuts will continue to be carried out jointly by the silvicultural department of the

Faculty of Forestry at Florence University and the Plant Pathology Research Station at Rome.

946.2. *Conferences and Excursions*

4479. **Recommendations of the eighth All-India Silvicultural Conference 1951.** *Indian For.* 78 (3), 1952 (108–26).

95. FOREST TAXATION

4480. HART, C. E. **Taxation of woodlands in England and Wales (up to and including the Finance Act, 1951).** Woodland Improvement (F.P.) Ltd., Huntley, Glos. 3rd ed., 1952. pp. 14. Price 2*s.* 6*d.*

Cf. *For. Abstr.* 11 (No. 3449).

4481. HARVE, P. Eräistä metsäverotusjärjestelmistä. **[Some systems of forest taxation.]** *Metsät. Aikak.* 1952 (2), (31–5, 58–9). [Fi.e.]

Examines the advantages and drawbacks of the present system in Finland and of other systems suggested to replace it, including suggestions from the current Forest Taxation Committee.

96. FOREST LABOUR QUESTIONS, LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 3879 *et seq.*

4482. KRALJIĆ, B. Ekonomska osnova progresivnog plaćanja radnog učinka. **[The economic basis of progressive payment for the result of work.]** *God. Zborn. zemj-šum. Univ. Skopje* 2, 1948/49 (1951), (35–95). [Serb.russ.f.]

A mathematical and economic analysis with a set of formulae, for the evaluation of economically justified progressive increases in the piecework pay basis when the individual output exceeds the set quota. This pay-rate increase (in %) is evaluated for three different calculation bases, and depends upon: the overhead/cost-price ratio %, labour/cost-price ratio %, and the work efficiency %. The whole subject is discussed with particular reference to the exploitation of forests and primary conversion of wood. There is a 10-page French summary.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences*

4483. Conférence de Nuwara Eliya (Ceylon) sur l'utilisation des sols tropicaux du 17 au 29 septembre 1951. **[Conference on land use in the tropics, held at Nuwara Eliya (Ceylon) 17–29 Sept. 1951.]** *Agron. trop.* 7 (2), 1952 (170–6). [F.]

Gives the text of a programme for soil improvement in the tropics, drawn up by the Conference.

972. *Organizations*

4484. **Activities of FAO under the expanded technical assistance programme 1950–1952.** FAO, Rome. 1952. pp. 76 + 8 plates.

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References: 1. *American Nurseryman*, Chicago; 2. *Bi-monthly Progress Report, Division of Forest Biology, Department of Agriculture*, Ottawa; 3. *British Columbia Lumberman*, Vancouver; 4. *FAO publications*, Rome; 5. *Foreign Commerce Weekly*, Washington; 6. *Hedeselskabets Tidsskrift*, Copenhagen; 7. *Italia Forestale e Montana*, Florence; 8. *Pulp and Paper Magazine of Canada*, Quebec; 9. *Report of the Forest Insect and Disease Survey*, Ottawa; 10. *Revue du Bois et de ses Applications*, Paris; 11. *Skogen*, Stockholm; 12. *Southern Lumberman*, Nashville, Tenn.; 13. *Timber of Canada*, Ottawa; 14. *Timber Trades Journal*, London; 15. *Timberman*, Portland, Ore.; 16. *Wisconsin Conservation Bulletin*, Madison; 17. *Wood Notes*, New Haven.

Conferences. The following have been arranged:

1952

Sept. 24–25 at Hannover-Münden. German Association on Timber Research, Conference on Timber Protection.

Sept. 25–27 in London. Conference on the Biology and Productivity of hot and cold deserts.

1953

July 29-Aug. 4 at Stockholm. International Union of Pure and Applied Chemistry: 13th Congress of Physical Chemistry—Wood and Paper Chemistry.

FAO. The FAO Conference, at its 6th Session, agreed that a Fourth World Forestry Congress should be held in 1954, and asked the Director General to consult with interested member governments as to a location for the congress. The Conference also considered that the Tropical Forestry Congress, postponed from 1951, should be incorporated in the Fourth World Forestry Congress; full opportunity would then be provided for the technical discussion of problems of particular concern to tropical countries. Among the further activities recommended by the Conference were the publication at 5-year intervals of available information on the forest resources of the world, and a *Eucalyptus* study tour to Australia for senior technicians (4; Dec. 1951).

The agenda of the 4th Session of the FAO Latin-American Forestry Commission, held 16–21 June 1952 at Buenos Aires, included the proposed setting up of a Latin-American Forest Research and Training Institute, and preparation for the next World Forestry Congress and a Tropical Forestry Conference (4; 1952).

An FAO/UNKRA (United Nations Korea Reconstruction Agency) mission has been sent to Korea to advise on a 5-year programme of reconstruction of agriculture and long-term plans for agricultural development. Among the questions to be considered are the right proportions of forest and agricultural land, and possible substitutes for wood as domestic fuel (4; August 1952).

The second session of the FAO Forestry and Forest Products Commission for Asia and the Pacific is to be held at Singapore from 1st to 13th Dec. 1952. Subjects on the agenda include problems of tropical silviculture (rain forests, Mangrove forests, afforestation of low-rainfall areas, use of exotic species); aerial photography for inventories of tropical forests; and progress reports on standardization of timber nomenclature, testing, grading and dimensions (4; 14.8.52).

The name of David Lubin Memorial Library has been given to the new FAO library in Rome. It contains 400,000 books and is the largest agricultural library in Europe. It is a synthesis of three libraries, those of the International Institute of Agriculture, the Centre International de Sylviculture, and the FAO library from Washington (4; 9.6.52).

Australia. Australian Paper Manufacturers Ltd., in its report for 1950–51, states that it is planting Pine 'on a scale which must be considered big by any world standard'. The company is using a fleet of tree-planting machines capable of planting 50,000 trees a day. In 1950–51 some 2000 acres were planted in Victoria and the aim for future years was 3000 acres. A subsidiary company, A.P.M. Forests Pty. Ltd. was to plant and acquire Eucalypt forests for pulpwood production (5; 7.7.52).

Brazil. Two companies were formed in 1951 to utilize the large Eucalypt plantations of Brazil for the manufacture of chemical pulp. Production will not begin until 1954 or later (5; 21.7.52).

Canada. The 1951 outbreak of the forest tent caterpillar in Ontario was probably the largest and most spectacular forest insect outbreak that has ever been recorded in the Province. In many areas

the numbers of insects were so great that once they had denuded the host stands of Poplar, Maple an Oak, they migrated in vast numbers in search of food, inundating roads, fields and even towns an villages. The caterpillars were responsible for delaying road and rail traffic, closing schools and publi buildings, and causing power failures. As a result of these extensive mass migrations, many unusua reports of their feeding were received (**9**; 1951).

A new joint laboratory of the Division of Forest Biology has been established at Quebec under th general direction of Dr. L. Daviault, formerly chief of the Bureau of Entomology, Quebec Departmen of Lands and Forests. Studies in forest pathology will be under the direction of Dr. R. Pomerlea who also was formerly employed by the Quebec Department of Lands and Forests (**2**; May/June 1952)

A new Laboratory of Forest Biology is to be constructed on the campus of the University of Ne Brunswick, Fredericton. This is to be a centre for research on forest insect pests and diseases in th four Canadian Atlantic Provinces. The centre will be administered by the Division of Forest Biolog of the Department of Agriculture (**8**; June 1952).

It has been announced from Victoria by the Minister of Lands and Forests that a forest protectio flying contract has been awarded to Central B.C. Airways Ltd. The new flying contract will run ti 1954 and calls for six aircraft to be at the disposal of B.C. Forest Service officers during the fire seaso A total of 2,260 hours is contracted for during 1952. Under the new contract each of the aircraft wi be equipped with radio. One aircraft will be stationed at each of the five forest district headquarter The sixth aircraft will be based at Kamloops and is for the use of both the Kamloops and Nelson fores districts. Under the contract, any of the planes can be transferred into districts suffering from fire Each of the aircraft is equipped with pontoons, is capable of carrying pay loads of 1,000 pounds, an is able to drop supplies which can include radio sets, power saws, power pumps, timber, food and a fire-fighting equipment, to crews on the ground (**3**; April 1952).

The Forest Products Laboratory, Ottawa, is studying decay and stain in Poplar pulpwood. Subject covered include: the rate at which wood deteriorates in piles in the field; the type and amount o decayed and discoloured wood that can be economically used in pulp manufacture; and the com parative damage and rate of deterioration caused by rots in the living tree and those infecting the woo after felling. Extensive sampling of wood from freshly felled trees has yielded over a dozen fung causing heartwood rot in living trees, and some of these have been found in active growth on boli after storage for three years. Other fungi attacking only felled wood have been obtained from woo from the piles (**8**; July 1952).

A change in the composition of log rafts for towing in British Columbian waters is being introduce The new type of boom consists of logs made up in bundles of truck-load size which are held togethe with patent self-locking hooks and lines. It is said that these booms are more cheaply and quickl made up than Davis rafts (**13**; July 1952).

The Irving Pulp & Paper Company Ltd., New Brunswick, is using an aeroplane to spot log jams i its spring drive on the Grand River (**8**; July 1952).

In a recent case before a Canadian court, structural characteristics of certain logs were used a evidence to help establish legal ownership. Laboratory evidence, supplementing that presented b the Ontario Provincial Police, was obtained by co-operation between the R.C.M.P. Crime Detectio Laboratory and the Forest Products Laboratory, Ottawa. Structural examination of the butt ends o some logs showed peculiarities and individual patterns of heartwood and sapwood that matche corresponding features of the stumps, although the top of the stumps had been sawn off and a mech anical fit of log to stump was impossible. The matching structural features were accepted by the cou as proof of the exact location and ownership of the original standing timber (**13**; June 1952).

Denmark. Strong north winds on 11 Feb. 1952 caused severe damage to plantations in central an W. Jutland. In forests owned or managed by the Danske Hedeselskab, 150,000 cu.m. of softwoo was thrown by the wind. The damage was most severe in areas where there was deep snow, and fairl slight in E. Jutland and on the islands, where there was little snow although the wind was equall strong (**6**; 30.6.52).

France. A ministerial decree of 15 Feb. 1952 set up a new Centre Technique du Bois by a fusio of the existing Centre des Exploitations, Scieries et Industries forestières and the Centre des Industri du Bois et de l'Ameublement. The function of these 'Centres' is to promote improvements in tech nique and increased yields and to maintain standards of quality in the industry (**10**; June 1952).

Netherlands. The Afrika Institute of Rotterdam in co-operation with the University of Amsterda announces that it is installing a laboratory to conduct research on the manufacture of pulp from woo native to French Equatorial Africa and the Belgian Congo (**3**; April 1952).

Sweden. Last summer the Swedish Meteorological and Hydrological Institute undertook, at the request of the Forest Department, a series of special weather forecasts for slash burning. These forecasts could not, however, be sent out before 8 a.m., too late for planning the day's work, and in any case the weather throughout the summer was obviously unsuitable for slash-burning. In more normal summer weather the forecasts should be very useful for slash-burning in Norrland. The Weather Service and the Broadcasting Service have arranged for an earlier transmission of the forecasts, which will be read every week-day from 15 May to 15 September this year as part of the ordinary 6.35 and 8.05 a.m. weather forecasts. The normal weather-forecast districts have been sub-divided into much smaller areas for this purpose. The weather service has asked for comments and particularly for criticism of the accuracy of the forecasts (**11**; 15.5.52).

U.S.A. Last autumn the Weyerhaeuser Timber Company planted on average 3,000 3-year-old Ponderosa Pines a day on 45 acres, using a Caterpillar D4 tractor, with a Lowther planter model CSM-2 and a La Plant Choate bulldozer. When the young trees were ready for removal from the nursery, 4-ft. beds were dug with a channel iron lifter, operating at a depth of 10–11 in. The soft soil fell easily from the roots and the stock was gathered and packed in peat moss. At the planting site the roots were trimmed to 9–11 in. and dipped in a solution of soil, water and commercial hormone. They were then planted by the Lowther planter drawn by the D4 in first gear, while the tractor bulldozer blade cleared away the debris of rocks, brush and dead logs over the burned-over area. The trees were planted at 700 to the acre, a spacing of roughly 5 × 8 ft. (**3**; April 1952).

A shelterbelt of Cottonwood, Willow, Elm and Ash has been established to protect the town of Shelly, Minn. from the high snowdrifts characteristic of winter in the Red River valley. The shelterbelt was planted in 1948 after successive winters with 30-ft. drifts had all but buried the town. The belt is 150 ft. deep and ½ mile long. The Cottonwoods and Willows are now 20 ft. high and the slower growing Ash and Elm over 6 ft. high, and snow drifts are now of manageable proportions (**1**; 15.5.52).

At a meeting between the N. Dakota state farm forestry committee and members of the experiment station staff, recommendations were made on the use of *Rhamnus dahurica* for hedges. No new sowings are to be made in the state, and all nursery stock should be planted by the end of the 1953 planting season. Seedlings now in the nurseries may be planted but only in the western half of the state. It is not proposed to destroy existing Buckthorn plantings. The N. Dakota Agricultural Experiment Station is being asked to start research on the relationship between various Buckthorn species and crown rust of oats. If this shows that these precautions are unnecessary, planting will be permitted again. A similar policy has been adopted in S. Dakota (**1**; 15.4.52).

An important precedent has recently been established by the Travelers Insurance Co., in issuing a first mortgage loan on standing timber to the Southern Oregon Sugar Pine Corp. It is believed that this is the first time that such a loan has been made by an insurance company on western timber lands, with standing timber used as a collateral. Simultaneously with the issue of this long-term loan, a mortgagee's fire insurance policy on the timber was placed, and it is believed that this is the first time that such a policy has ever been written in the United States. Having no precedent to go by, it was necessary for the insurance company to establish entirely new forms and conditions for such a policy (**15**; Feb. 1952).

Hartford Fire Insurance Co., Hartford, Conn., is now writing fire insurance on woodland. So far these policies have been on: (*a*) standing sawtimber of specified species—hardwoods 10 in. and larger d.b.h., and softwoods 6 in. and larger d.b.h., and (*b*) standing hardwood timber of specified species, not less than 3½ or more than 10 in. d.b.h. The rates range from 75 cents minimum to $2.00 or more, depending on the particular risk. One condition of the policy is that if cutting be begun or any portable mills erected on the property or within half a mile, without consent of the insurance company, the policy will be cancelled (**17**; May 1952).

The Wisconsin Conservation Department has embarked on a new programme of producing deer fodder. Young trees and saplings of small value are felled or bulldozed, so that the deer can browse on the tops, while the stumps produce coppice shoots. The method has been tested for some years and is now to be attempted on a larger scale (**16**; March 1952).

An unusual one-man saw, described as a 'rimcircle' saw has recently been developed in America by the Barker Saw Co. It has a circular blade 3 in. wide and 30 in. in diameter, encased in an aluminium alloy frame, and held in position by 3 ball-bearing steel rollers. The saw is powered by a single-cylinder air-cooled petrol engine. A hook arrangement holds the saw to the timber, the blade rotating away from the operator (**14**; 26.7.52).

Dr. C. E. Jenkins of East Westmorland, N.H., has designed and patented a saw for felling, cross-cutting, limbing and general use, that appears to have great promise. In appearance it resembles a

carpenter's handsaw protruding from an engine. The blade has specially designed teeth for discharging sawdust, and a flexible damping strip to prevent flutter. It is driven back and forth at very high speed. A 12-in. log can be cut through in one minute. The original model, with a 1¾ h.p. petrol engine, weighs 22½ lb., but this can be considerably reduced (**17**; May 1952).

A new company, Needle-Pak Co. of Hathaway Pines, California, needs 500 tons of dry Pine needles before the winter, to make foundation pads for funeral sprays; the needles are used instead of more expensive sphagnum moss from the northwest. The company pays $20/ton for needles free of cones and twigs. Needles of Ponderosa, Sugar and Monterey Pines are suitable (**15**; Aug. 1952).

The Federal Trade Commission announces that it has invited interested persons and representatives of groups and organizations to attend and take part in a public hearing to be held under the Commission's auspices on the subject of the proper use of the word 'Mahogany' in descriptive designations and representations of wood and wood products. Questions suggested for discussion are: (1) To what wood or woods should the word 'Mahogany' be permitted to be applied with or without geographical or other qualifications (2) Does the prevention of unfair methods of competition or unfair or deceptive acts and practices require that 'Mahogany' be used only for woods of the genus *Swietenia*? (3) To what extent does the present use of the word 'Mahogany' cause confusion, misunderstanding, deception or unfairness? (4) Would formulating and issuing a Wood Name Guide on proper commercial application of the wood 'Mahogany' help business and the buying public by preventing misunderstanding, confusion and deception in marketing wood and wood products?

U.S.S.R. A rodent-repellent treatment for seed is prepared as follows: The seeds are first coated with a mixture of flour-and-water paste and chloride of ammonia (250 g./litre of paste), and when this has set they are dusted with a mixture of phosphide of zinc and fine lime in equal parts, so that they are completely covered. The efficacy of the treatment is due to the repellent action of the chloride of ammonia, the toxicity of the phosphide of zinc and the protective action of the lime which prevents the decomposition of the phosphide in the soil. The coating adheres to the seed for a month or more, even in very wet soil, and does not impede germination—in fact it appears to have a positively stimulating effect on seedling development (**7**; June 1952).